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Farm Chemicals

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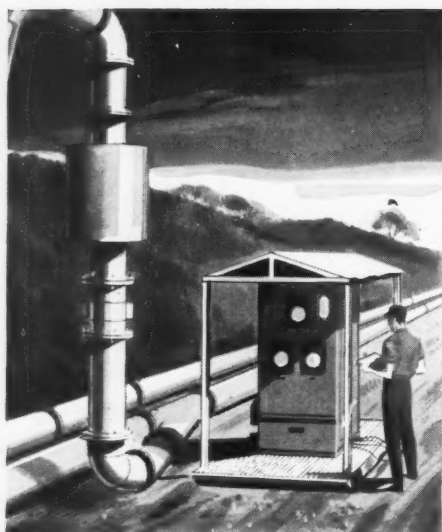
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VOL 121

NO. 1

St. Paul, Minn.
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INTERNATIONAL'S EXCLUSIVE DEVELOPMENT FOR... **GRADE UNIFORMITY**



Quality-Controlled

PHOSPHATE ROCK

The Electromagnetic Flow Meter Inspects Ore While It's Mined

Uniformity of your phosphate rock starts at the mine pit—where it should. When the slurry feed from the mine reaches the preparation plant at a uniform flow rate and with uniform density, processing of phosphate rock is more efficient. To obtain maximum control of feed flow, *International Minerals* has developed a new electromagnetic flow meter, with a density cell using radioactive emissions, which is clamped on the feed line. It continuously reports flow rate and

feed density on recording stations, both at the mine pit and plant. This is only one of the many controls and tests, in plant and analytical laboratory, that guard grade uniformity and quality of *International Phosphate Rock*—from the mine pit to your loaded car. For consistently uniform quality, for prompt deliveries of the grade you want in the tonnages you need, it's good business to depend on *International Minerals* for *Quality-Controlled Phosphate Rock*.

For acidulation . . . for industrial chemicals . . . for direct application to the soil.
(Ground Rock)

INTERNATIONAL MINERALS  **& CHEMICAL CORPORATION**
PHOSPHATE MINERALS DIVISION 20 N. WACKER DRIVE, CHICAGO 6

PHOSPHATE MINES AND PLANTS IN FLORIDA AT NORALYN, PEACE VALLEY, ACHAN, MULBERRY; IN TENNESSEE AT MT. PLEASANT, WALES AND GODWIN

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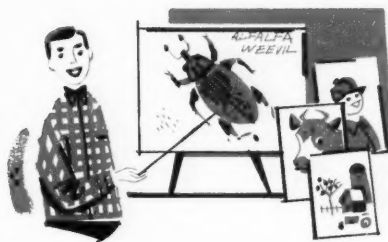
Sign up now for the 1958

HEPTACHLOR

INSECTICIDE PROGRAM



**SALES
SUPPORT
IN
DEPTH!**



THE 1958 HEPTACHLOR DEALER "SALES-BUILDER" PROGRAM—For many years, Heptachlor promotional campaigns have helped formulators increase demand at the dealer level.

In 1958, we would like to increase this support of your own sales program. For this reason, we have taken the best features of previous programs, and added new features, based on information obtained in discussions with farm supply dealers everywhere. The result is a more comprehensive and penetrating program: sales support in depth.

INSECT CONTROL REFRESHER COURSE—We have found that most dealers would appreciate more basic information about the use of insecticides. On the other hand, any dealers who are experts themselves must work with inexperienced sales people. Also, your own salesmen cannot afford to spend the time necessary to explain all aspects of insecticide use to all dealer personnel. Thus, the 1958 Heptachlor program will include an informative "salesman's insect control refresher course." Your dealers will be provided with information that will enable them to discuss insecticides more freely with their customers. It will enable them to sell insecticides with authority and intelligence. Included in the program

will be "down to earth" sales techniques that every dealer can use, regardless of size.

MONTHLY INSECT CONTROL GUIDE SHEET—Each month, your dealers will receive an insect control guide sheet, containing information about crop pests common to their part of the country. These sheets will include insect appearance, life habits, damage, control. They will serve as a continuing textbook.

MONTHLY INSECT CONTROL INFORMATION SERVICE—NEW PROMOTIONAL AIDS—Current insect control information will be provided on a continuing basis through a monthly newsletter. There will also be many profit-making promotional aids. Participating dealers will receive advance copies to stay ahead of competition.

OTHER IMPORTANT FEATURES—Those of your dealers who participate in the Heptachlor program will receive a free listing in any Velsicol advertising run in their local areas. A reference list of these dealers will be prepared, and sent to farmers who request the name of a source for Heptachlor formulations.

FIND OUT NOW HOW THE 1958 HEPTACHLOR PROGRAM CAN HELP YOU INCREASE DISTRIBUTION AND SALES! MAIL THIS COUPON TODAY!



VELSICOL

VELSICOL CHEMICAL CORPORATION
330 East Grand Ave., Chicago 11, Ill.

International Representative: Velsicol International Corporation, C. A.
P.O. Box 1687 • Nassau, Bahamas, B.W.I.

HEPTACHLOR	CHLORDANE	ENDRIN
PARATHION	METHYL PARATHION	GIBBERELLINS

VELSICOL CHEMICAL CORPORATION FC-18
330 East Grand Avenue, Chicago 11, Illinois

Please send me complete details of the 1958 Heptachlor Insecticide Dealer Sales-BUILDER Program.

Name _____

Company _____

Address _____

City _____ Zone _____ State _____

"...more production...
less operator fatigue...
lower maintenance"



PURCHASE AND
HOUGH
LEASE PLANS



RIP UP PACKED FERTILIZER

Scarifier teeth attachments are now available for HA and HAH "PAYLOADER" models — quickly loosen packed fertilizer from runways and floors by reverse "PAYLOADER" travel. Hinge-mounted on the boom — easily removed when not needed.

THE FRANK G. HOUGH CO.

731 Sunnyside Ave., Libertyville, Ill.

Send PAYLOADER information on:

- ☐ HA (2,000 lb. carry) and HAH (3,000 lb. carry)
- ☐ Scarifiers for HA and HAH
- ☐ Larger models (up to 9,000 lb. carry cap.)

Name.....

Title.....

Company.....

Street.....

City..... State.....

1-A-1

Meridian Fertilizer Factory, Hattiesburg, Miss. has 5 model HA and 3 larger HAH "PAYLOADER" tractor-shovels. Speaking of the new style model HA the plant superintendent, William H. Field says, "Roll-back, breakout bucket action and torque converter drive is an ideal combination. Production increased 30% along with lower maintenance and less tire wear and less operator fatigue. We have been using Hough equipment 11 years."

Plant after plant like Meridian testify that they get more and better performance from "PAYLOADER" tractor-shovels. They tell us that roll-back bucket action, hydraulic-load-shock-absorber, breakout digging action and the many other "PAYLOADER" features all add up to increased production, lower maintenance and greater safety.

If you have an older model HA or model HAH "PAYLOADER" or any other tractor-shovel in their size ranges, it will pay you to see how much more these new style units can produce. Your Hough Distributor would like to show you. Contact him today, and ask about Hough Purchase and Lease Plans too.



PAYLOADER®

MANUFACTURED BY

THE FRANK G. HOUGH CO. LIBERTYVILLE, ILL.

SUBSIDIARY—INTERNATIONAL HARVESTER COMPANY



IN THIS ISSUE

► S. H. Wittwer and M. J. Bukovac, Department of Horticulture, Michigan State University, describe results of field tests with Gibberellin. Pictures and a table summarizing the effects of the plant growth stimulant highlight the article beginning on . . . **page 36.**

► USDA, whose scientists originated aerosol bombs, have improved the design of aerosol containers. A description of the new design is on . . . **page 38.**

► A new book, **Forest Fertilization**, promises to be a boon to those engaged in forestry research as well as forestry educators. The 300 page book is published by the State University College of Forestry at Syracuse University . . . **page 38.**

► **Farm Chemicals** presents a picture story of the recent CFA convention in San Francisco . . . **page 39.**

► Fertilizer and Plant nutrient consumption in the United States is discussed at length by USDA experts. Well delineated graphs are also included . . . **page 40.**

► Velsicol Chemical Corporation's "Show and Sell Contest" is described on . . . **page 43.**

► In an address before the Entomological Society of America, M. R. Clarkson, deputy administrator for Research Service, USDA, described past and present methods of pest control. His speech is recorded on . . . **page 44.**

► National Agricultural Chemicals Association reports that approximately \$250 billion basic pesticide chemicals were sold in 1957. Other market developments are outlined on . . . **page 48.**

► "Fundamental Research in Weed Control" will be the theme of the January 13-15 meeting of the Weed Society of America. A preview of the meeting is found on . . . **page 48.**

COVER PICTURE

The adult gypsy moth lays her eggs in July and August, in clusters on a tree trunk, on a bit of bark, or in some other out-of-the-way place (upper left). Clear warm May days of the following year bring out the young leaves and also bring the caterpillars out of the eggs (upper right). The caterpillars feed destructively on the foliage of their preferred trees through June and July. Then they spin a few threads to hold them in place while they pupate (lower left) and about 10 days later the adult moths emerge to start the life cycle all over again (lower right). A comprehensive article on pests and methods of control begins on **page 44** of this issue. USDA Photo.

JANUARY, 1958

Farm Chemicals

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STAFF

Publisher	SAM LEWIS VEITCH	Wash. Bureau Chief	JOHN HARMS
Associate Editor	PHYLLIS MARRON	Business Manager	A. A. WARE
		Circulation Manager	DOROTHY E. SMITH

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A magazine national in scope and circulation and devoted to manufacturers, mixers and formulators of plant foods and pesticides. It has a free controlled circulation within specified segments of the industry.

Subscription rates to all others are: U.S., its possessions, Canada, Cuba and Panama—\$6.00; Mexico and foreign: \$7.50. Single Copy—\$.50. Back Numbers \$1.00.

Published monthly by

Ware Bros. Company, 317 N. Broad St., Philadelphia 7, Pa.
Telephone MAket 7-3500

Accepted as Controlled Circulation publication, Phila., Pa.

Business & Management

PHOSPHOROUS SOURCE POSSIBILITIES STUDIED

A phosphorous deposit covering some 15,000 acres at Vernal, Utah, was inspected recently by Utah governor George D. Clyde, officials of the Federal Bureau of Reclamation, and executives of Stauffer Chemical Co., Western Phosphates, Inc., Mountain Copper Co., Ltd., and San Francisco Chemical Co. It is anticipated that the deposit—the nation's largest—may become a major source of phosphorous within the next few years.

The San Francisco Chemical Co., jointly owned by Stauffer and Mountain Copper Co., Ltd., holds exclusive rights to the deposit.

To render the deposits economically utilizable, it would be necessary to build a beneficiation plant at the mining site, espe-

cially if the rock were to be shipped to customers at distant points. The San Francisco company has developed a beneficiation process at its Lefe, Wyoming plant which will upgrade the ore for either electric furnace or fertilizer use. It is anticipated that a substantial tonnage of the Vernal ore will be treated at Lefe in 1958 to prove out the beneficiation process on a full plant scale basis.

MONTROSE UPS DDT PRICE

Montrose Chemical Co. has advanced the price of technical grade DDT 2 cents per pound. The company's new carlot prices for DDT 100%, will be 21 cents per pound for chips or flake, and 22 cents per pound for powdered

material, f.o.b., plant, freight allowed to all Continental U.S. points packed in multiwall paper bags.

SWIFT & CO. REPORTS PLANT & PERSONNEL CHANGES

The Plant Food Div. of Swift & Co. has been renamed the Agricultural Chemical Div. The company has also announced that its Chicago organization has been realigned along product and functional lines. T. L. Adcock, formerly northern marketing manager, has been named marketing chief for all products while W. J. Chapin, former southern marketing manager, now heads agricultural plant food marketing. E. E. Randolph has become head of garden products marketing and G. E. Bruington retains responsibility for pesticide marketing.

M. D. Sanders, formerly Director of Research, is now director of research & development; and A. H. Bowers, formerly agronomist, has assumed responsibility of merchandising and technical service for all products of the division. The Manufacturing Dept., headed by U. C. Ellis, general superintendent, has been renamed the Production Dept., while the Raw Materials Dept. under B. W. Guess, is now the Procurement Dept.

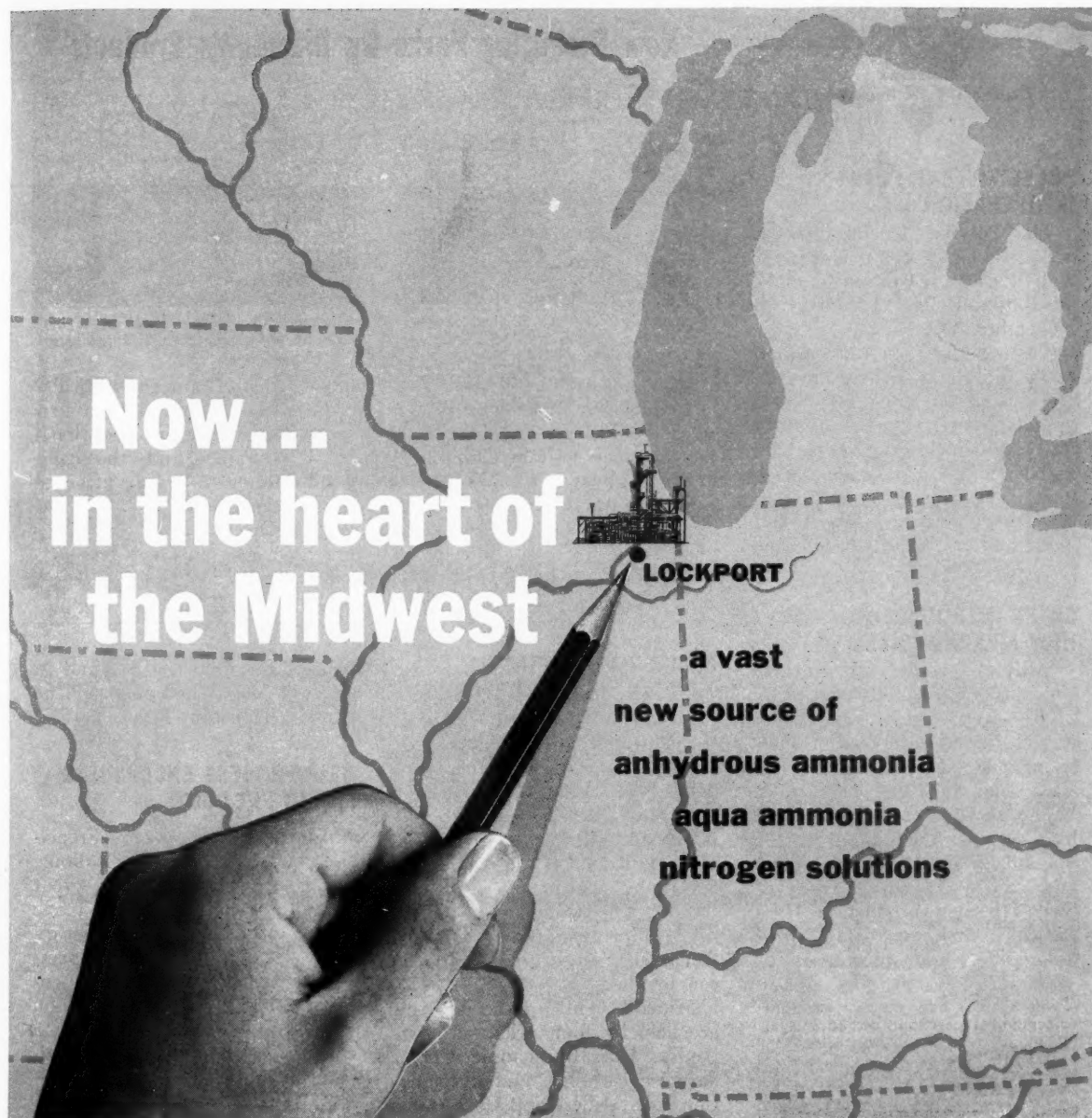
Inspecting the 15,000 acre phosphorous deposit at Vernal, Utah, are, left to right: Roy Martindale, consulting engineer; Roger W. Gunder, Stauffer vice-president, Pacific coast; General Maxwell Rich, Utah National Guard; Governor George D. Clyde; and Vincent O'Donnell, Stauffer director and general counsel.



DUPONT PLANS 15 MILLION FOR BASIC RESEARCH

The DuPont Co. this year will spend more than \$15,000,000 on its fundamental research program in which approximately 400 scientists are engaged.

Typical of the company research is the project started 20 years ago on plant growth and the effect of hormones on plant life. This study led (18 years after it was initiated) to the full-scale manufacture and sale of "Karmex" herbicide and "Telvar" weed killer. "Karmex" is used widely as a selective weed killer in such crops as sugar cane, pineapple and others; "Telvar" as a soil sterilizer to eliminate vegetation where it would be a fire hazard or a nuisance.



Texaco's new Lockport plant is centered among all major rail, water and truck routes—a reliable source of ammonia and nitrogen solutions.

TEXACO LOCKPORT (ILL.) AMMONIA PLANT NOW MAKING DELIVERIES

Orders for anhydrous and aqua ammonia, and nitrogen in a variety of solutions are mounting. The advantages of doing business with Texaco Lockport are compelling:

Texaco closeness: The new ammonia plant is located right in the heart of the farm belt. Shipping distances are shorter, formulators get faster and better service.

Texaco uniformity: The Lockport plant is new from top to bottom—new processing equipment to assure product uniformity; new handling equipment; and a brand-new transport fleet to speed deliveries and protect purity in transit.

Texaco service: Texaco is famous for its service. The

Texaco man will see that your orders are handled according to instructions and that deliveries are scheduled to tie in with your operations.

For fast reliable petrochemical service, call or write The Texas Company, *Petrochemical Sales Division*, 332 South Michigan Avenue, Chicago 4, Illinois, or 135 East 42nd Street, New York 17, N. Y.



TEXACO
PETROCHEMICALS

POLYETHYLENE PLANT IN OPERATION

The Polymer Chemicals Div. of W. R. Grace & Co. opened a high density polyethylene plant at Baton Rouge, La., late in November.

The new plant, first of its kind to be built in Louisiana, has an annual capacity of 50,000,000 pounds and is the largest plant of its kind in the world to come on stream as an integrated operating unit. The overall investment in commercial plant, research and development facilities exceeds \$18,000,000.

SWIFT INTRODUCES NEW MERCHANDIZER

Swift & Co.'s Agricultural Chemical Div. has introduced its "End-o-Rak," a floor stand which provides 16 square feet of shelf facing and eight square feet for advertising messages.

The stand, created and designed by Container Corp. of America's Specialty Div., is in four colors and can carry seven cases of Swift's garden products. It is furnished free to dealers with orders of seven or more cases.

Swift & Co.'s new compact merchandizer utilizes space to its best advantage.



New Packaging Perks Up Diamond's Products



Pictured is Diamond's original product line in the company's 1912 packaging.

Diamond Alkali Co. reports its comprehensive package-redesign program has given the firm's packages new visibility, legibility, and uniformity. They feature a uniform, standardized "family" design theme whose basis is the company's recently introduced trademark, The Chemical Dia-



Diamond Alkali's "new look" packaging for the firm's more than 100 products.

mond, which frames a vertically positioned diamond with a new shape inspired by the traditional chemical retort and the calligraphic letter "d" from a fifteenth century manuscript.

Pictured are the company's first packages and its latest containers.

AP&CC TO INVESTIGATE MANGANESE ORE DEPOSITS

American Potash & Chemical Corp. will conduct exploratory investigations of manganese ore deposits located in 10,700 acres of land near Batesville, Ark; approximately 100 miles northeast of Little Rock. If the studies are favorable, present plans include forming a new company to undertake commercial production, with American Potash holding 55 per cent of the stock.

Mineral rights to the deposits are held by four Arkansas companies, U.S. Manganese Corp., Arkansas Mining and Exploration Co., Miller-Lipp Corp., and Miller-McGee Manganese Corp.

NAT. DISTILLERS ACQUIRES 100% OF NATIONAL PETRO

National Distillers and Chemical Corp. has acquired Panhandle Eastern Pipe Line Company's 40 per cent minority interest in National Petro-Chemicals Corp. thus making the latter a 100 per cent owned subsidiary of National Distillers. In this transaction, Panhandle Eastern exchanged its interest in National Petro for 1,500,000 shares of the common stock of National Distillers.

National Petro owns and operates a large petro-chemicals

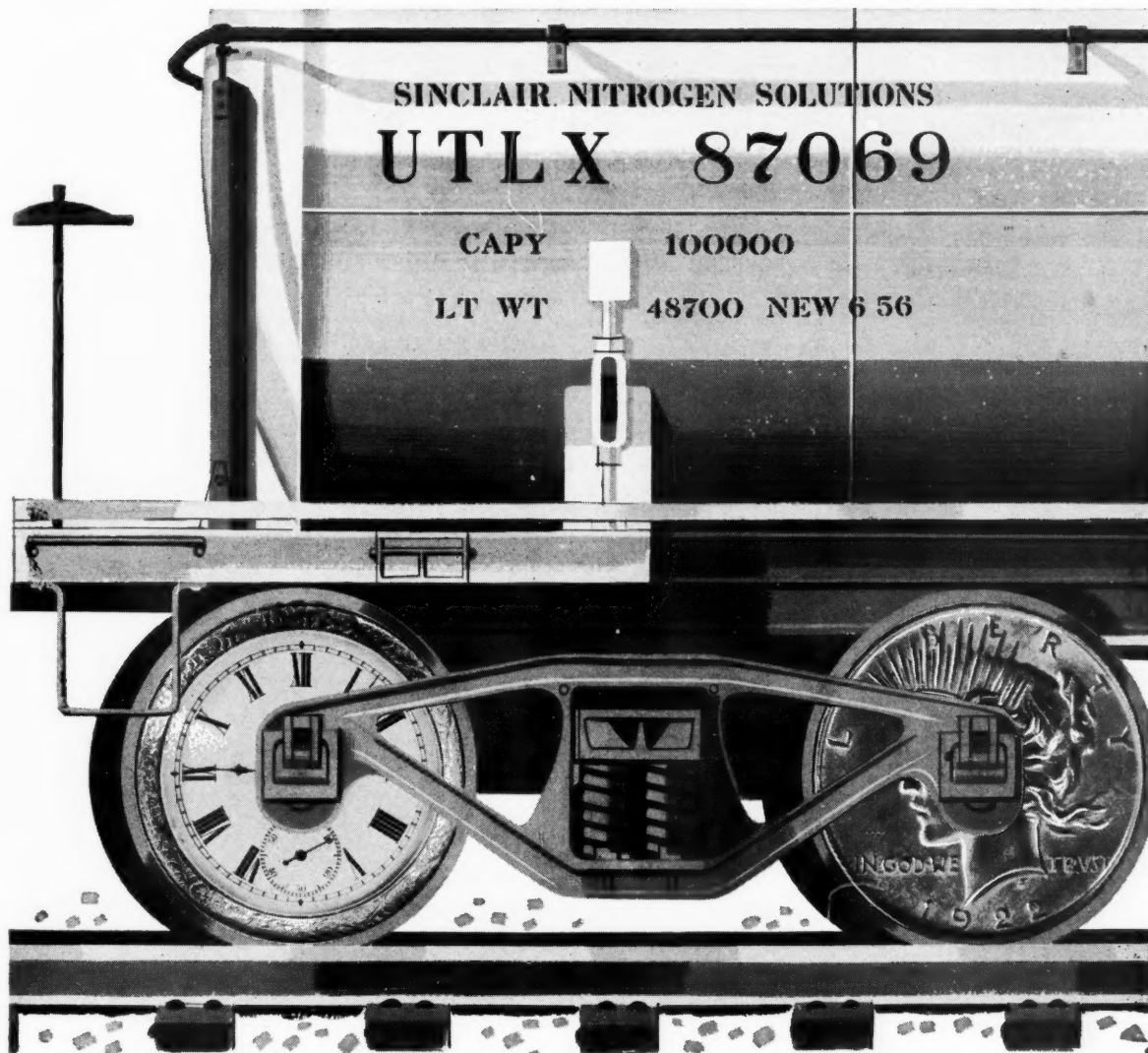
plant in Tuscola, Ill., and a recently constructed polyethylene plant in Houston, Tex.

NEW PROCESS ENCAPSULES LIQUID PRODUCTS

An invention of a French chemist, Jean Pathus-Labour, makes it possible for a great many liquid products to be made in the form of small round capsules. The process consists principally of a simple and inexpensive method of encapsulating non water-miscible substances in a coating of highly resistant calcium alginate.

In addition to liquids, solids in powder form can also be encapsulated. For instance, fertilizer could be encapsulated in soluble alginate and distributed at the time of seeding. Rain would release the fertilizer when the seedlings came up.

The process is an outgrowth of the Carburolith Process, an original invention by Pathus-Labour, for "solidifying" hydrocarbon products which he had developed in collaboration with the Glenn L. Martin Co. while he was here at the request of U.S. War Dept. in 1948. The present process was developed with the assistance of the Southwest Research Institute, of San Antonio, Tex.



How Rapid Delivery of Sinclair Nitrogen Products CAN SAVE YOU TIME AND MONEY

Rapid—on-time—delivery to your plant is an important reason why you should order nitrogen supplies from Sinclair. It can make the difference between filling an order at a profit or losing a sale and customer good will.

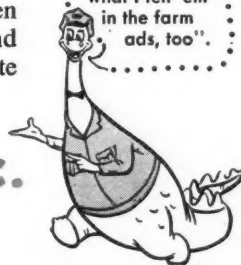
A big, new nitrogen plant at Hammond, Indiana, is in the center of the nation's

rail and truck transportation network. Large storage facilities in this key location mean that your order can be filled for fast delivery when you need it.

For fast, low-cost delivery of nitrogen solutions, anhydrous ammonia and aqua ammonia call on Sinclair. Write or phone . . .

Dino, the Sinclair Dinosaur, says,

"Fertilize for greater farm profits. That's what I tell 'em in the farm ads, too".



SINCLAIR CHEMICALS, INC.

(Affiliate of Sinclair Refining Company)

600 Fifth Avenue, New York 20, N. Y. — Phone Circle 6-3600
155 North Wacker Drive, Chicago 6, Illinois — Phone Financial 6-5900

THE MAN WITH THE



MULTIWALL PLAN



**UNION
PACKAGING SPECIALIST
DON DEININGER**

**saves
Multiwall
user
\$8 per M
through
specifications
review**

A Chemical Company, already using 43 different sizes and types of Multiwalls, planned to add new products to its line. Union Packaging Specialist Don Deininger recommended a simplification of Multiwall specifications and inventory. Union prepared a Specifications Manual for the manufacturer, also simplified, unified and modernized his bag designs.

Results: user reported: (1) Union's recommendations for re-designing bag sizes and constructions in some instances saved as much as \$8 per M.

(2) The new Specifications book enabled the customer to order bags more easily and accurately. It also simplified his inventory control.

(3) The new designs established a visual relationship between his family of products, enabled his sales force to do a better merchandising job.

This is a typical example of Union's 5-Point Multiwall Plan

in action. Perhaps it can produce gains in your own Multiwall packaging operation. Write for additional information.

**Union Multiwall Recommendations
are based on this 5-point
Packaging Efficiency Plan**



- DESIGN
- EQUIPMENT
- CONSTRUCTION
- SPECIFICATION CONTROL
- PLANT SURVEY

**Better Multiwall performance
through better
planning**



UNION'S PACKAGE ENGINEERING DEPARTMENT will study your Multiwall bagging methods and equipment and make appropriate recommendations, regardless of the brand of Multiwalls you are now using.

UNION MULTIWALL BAGS

UNION BAG - CAMP PAPER CORPORATION

233 BROADWAY, NEW YORK 7, N. Y.

*“Ah eat like a hawg...when it's
corn grown in potash-enriched soil!”*



FERTILIZER MANUFACTURERS—you can count on the United States Potash Company for know-how and experience in the production of potash. USP now offers 3 outstanding grades. USP's Higran and Higrade muriate (both white, both with 62/63% K_2O) are the purest agricultural muriates now available. USP's Granular muriate of potash (pink-red) contains 60% K_2O . All three grades are non-caking and free-flowing throughout.

Our Technical Service Department welcomes your inquiries.

UNITED STATES POTASH COMPANY

DIVISION OF UNITED STATES BORAX & CHEMICAL CORPORATION

50 Rockefeller Plaza, New York 20, New York

Southern Sales Office: Rhodes-Haverty Building, Atlanta, Georgia



MEMBER:
AMERICAN
POTASH
INSTITUTE

REG. U. S. PAT. OFF.

FARM CHEMICALS

People

American Agricultural Chemical Co. has announced several personnel changes: R. T. Gravitte, formerly with the company's Alexandria, Va., sales office, has been named assistant manager of sales at the Cincinnati fertilizer plant; R. T. McFerson has assumed the same role at the Fulton, Ill., fertilizer plant, and W. A. Glover, formerly assistant superintendent of production at the Pensacola, Fla., works, has been made production superintendent at the Columbia, S. C., plant.

Joseph Padar assumes the post of chief chemist of the chemical control laboratory at Danville, Ill., and J. W. Grooms, formerly with the Savannah, Ga., fertilizer sales office, has become assistant manager of fertilizer sales at Greensboro, N. C.

Atlas Powder Co. has established a Toxicology Section in its Chemical Research Dept. to carry out research on the safety of Atlas products from the standpoint of handling, use and consumption. Dr. Joseph F. Treon will head this newly organized section.



Treon

Atlas has also announced the appointment of Theodore P. Malinowski as an assistant director of product development. Formerly development manager in the department, he will head up the exploratory field development and marketing research sections of the department in the newly-created position.



Wiggins

with American Agricultural Chemical Co.

Chemagro Corp. has appointed T. G. Lawton, Jr. head of its newly-created Market Development Section. Lawton will be at Kansas City, Mo., where Chemagro is constructing new research laboratories and a new manufacturing plant.

Collier Carbon and Chemical Corp. has made two additions to its agricultural technical service staff. Keith T. Henson has been assigned to testing and developing liquid fertilizer application equipment and Edwin A. Wyatt as a technical service representative.

Davison Chemical Co., Div. of W. R. Grace & Co., has appointed Robert D. Goodall and H. B. DeVinny vice presidents. Goodall, who has been general manager of petroleum catalysts, becomes vice president and general manager of the Chemicals Div. succeeding F. C. Nicholson. Nicholson will assume increased responsibilities in the company's development projects in the international field, which are now under active negotiation. DeVinny, director of industrial and public relations, becomes vice president with the same responsibilities.

Bradley & Baker. H. Carl Wiggins has joined the company as its sales representative in Atlanta, Ga. Wiggins, a graduate of Auburn, was previously

Diamond Alkali Co. has announced the retirement of John C. Long, salesman for Diamond Black Leaf products. Long's career in the industry spans 32 years, 23 of which have been in the agricultural chemicals sales field.

Dow Chemical Co.'s recent personnel appointments include naming Robert P. Harrison and John R. Fisher field specialists in agricultural chemical development. Harrison will be stationed at Washington, D. C.; Fisher at Seattle, Wash.

Dow also announced the retirement of Walter C. Dutton, formerly an assistant director of agricultural chemicals research.



Dutton

Dutton, associated with the company for 21 years, has been serving in a consultant capacity for the past three years.

DuPont Co. has elected Robert L. Hershey, general manager of the Polychemicals Dept., a director, vice-president and member of the firm's executive committee to succeed William H. Ward who retired from the posts after a 42-year career with the company. Walter H. Salzenberg, assistant general manager of the Polychemicals Dept., will succeed Hershey as general manager.

Federal Chemical Co. has elected Jefferson D. Stewart, Jr., president. Stewart succeeds John V. Collis, president since 1947, who has been elected chairman of the board. Stewart has been with Federal Chemical since 1936.



Stewart

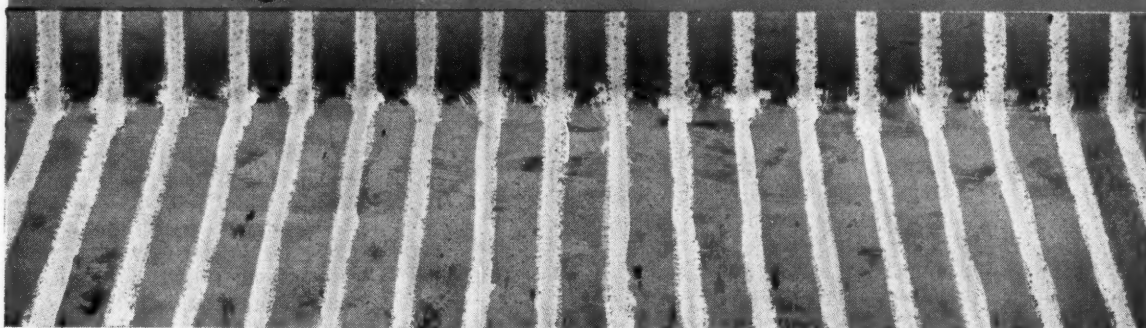
HEALTHY SOIL...
HEALTHY PROFITS!



HIGH GRADE MURIATE OF POTASH

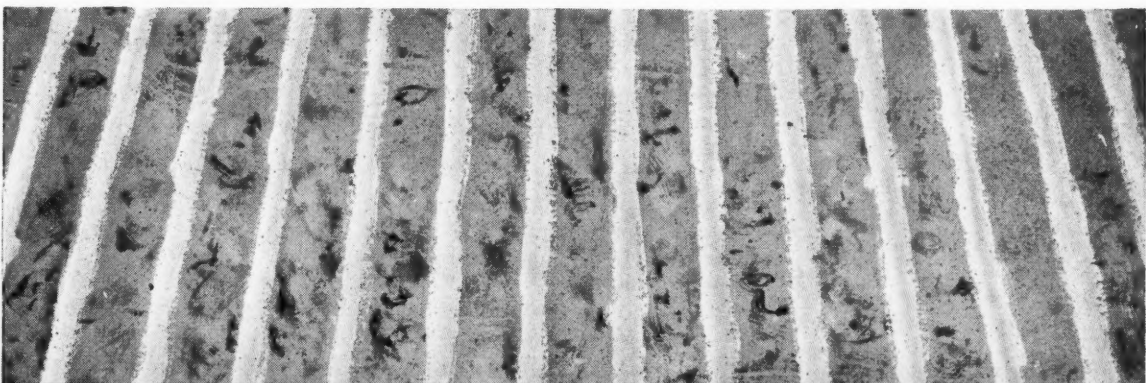
Duval Muriate of Potash—A vital element at low cost
for healthy soil and healthy profits.

• HIGH ANALYSIS • DEPENDABLE SUPPLY • UNSURPASSED SERVICE



DUVAL SULPHUR and POTASH COMPANY

MODERN PLANT AND REFINERY AT CARLSBAD, NEW MEXICO



ASHCRAFT-WILKINSON COMPANY

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Geigy Agricultural Chemicals, Div. of Geigy Chemical Corp. Leo Miles has been appointed as Simazin industrial sales specialist in charge of sales development and technical services for Simazin 50W, the company's new herbicide.

Hooker Electrochemical Co.

Thomas E. Moffitt has been elected company president to succeed Bjarne Klausen who will continue as director and who had served for nearly a year beyond the company's normal retirement age of 65 by special request of the board.



Moffitt

Moffitt, associated with Hooker since 1930, has been a director and executive vice president since Jan., 1956.

Other changes: Ansley Wilcox, 2d, secretary and general counsel, in addition is elected a vice president; Thomas F. Willers comptroller, also elected a vice president and treasurer; John F. Snyder retired as vice president but will remain as director and member of the finance committee; J. Clarke Cassidy, a director and former vice president, appointed to the finance committee.

Edwin R. Bartlett, chairman of the company's finance committee and a director of the company, died suddenly at his winter home in Florida, on Dec. 10 of a heart attack. Bartlett, 74, was company president in 1945-51 and board chairman in 1951-55.

Michigan Chemical Corp. has added Dr. Donald E. Overbeek to its research staff. Dr. Overbeek has been assigned to the development of new organic chemicals.

National Plant Food Institute

has named F. Todd Tremblay as its Pacific Northwest representative. Tremblay has been manager of the Fertilizer and Farm Chemicals Dept. of the



Tremblay

Washington Co-Operative Farmers Association.

Olin Mathieson Chem. Corp.

has appointed Dr. W. E. Hanford vice president for research and Richard M. Furlaud, general counsel. Dr. Hanford had been assistant to the president for research since joining the firm in July, 1956. Furlaud joined the company in 1955 as an attorney in the Legal Dept. and in May, 1957 was named assistant to the president, a post which he will continue. Robert E. McCormick, former general counsel, continues as secretary of the corporation and a corporate vice president.

Pennsalt Chemicals. Pennsalt's board of directors has appointed W. Cooper Willits treasurer. Willits has been assistant to the president since joining the firm in Nov., 1956.

Ravel Brothers, Inc. Erwin H. Klaus has joined the firm as sales manager. He was formerly marketing director of Northrup, King & Co.

O. M. Scott & Sons has made Warren A. Post manager of its Brands Dept. Post has been West Coast manager for the firm for seven years. His former position has been assumed by Edward Schultz.

Smith-Douglass has elected Bliss Ansnes and John L. Gibbons to its board of directors. Ansnes is a member of the law firm of Mudge, Stern Baldwin and Todd; Gibbons is executive vice president of Chemical Corn Exchange Bank and a director of the Angostura-Wupperman Corp.



Grant

tural technical services.

Sohio Chemical Co.

has promoted Sylvester Grant, Jr. to technical service representative. Grant will assist H. H. Tucker, director of the firm's agricul-

Texas Co. Dr. Robert Eischens has been promoted to the position of physical research associate at the Texaco Research Center. A member of the firm since 1948. Dr. Eischens' work at Texaco has been primarily concerned with catalysis as it relates to petroleum and its products.

United States Rubber Co.

Dr. W. F. Tuley has been assigned to the new post of group manager of chemical development for the company's Naugatuck Chemical Div. He will coordinate research and development on agricultural chemicals, heavy chemicals, chemical intermediates and chemicals used in plastics.

Virginia-Carolina Chem. Co.



Haden

has announced that Russell L. Haden, Jr., a former executive of Dewey and Almy Chemical Co., has been named general manager of the firm's Chemicals Div.

C. E. (Jack) Workman, field sales manager of the fertilizer division, has resigned his post.

The University of Wisconsin's Dept. of Entomology has added three members to its staff. They are Dr. Harry C. Coppel, assistant professor in biological control of forest insects; Dr. John M. Wright, assistant professor in agriculture extension and Dr. Dale M. Norris, Jr., assistant professor in research on insect transmission of Dutch elm disease.

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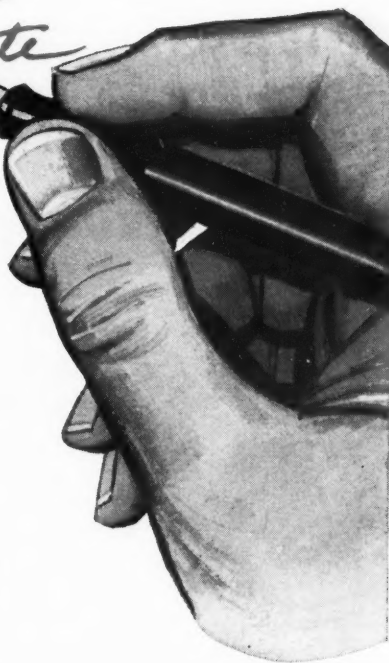
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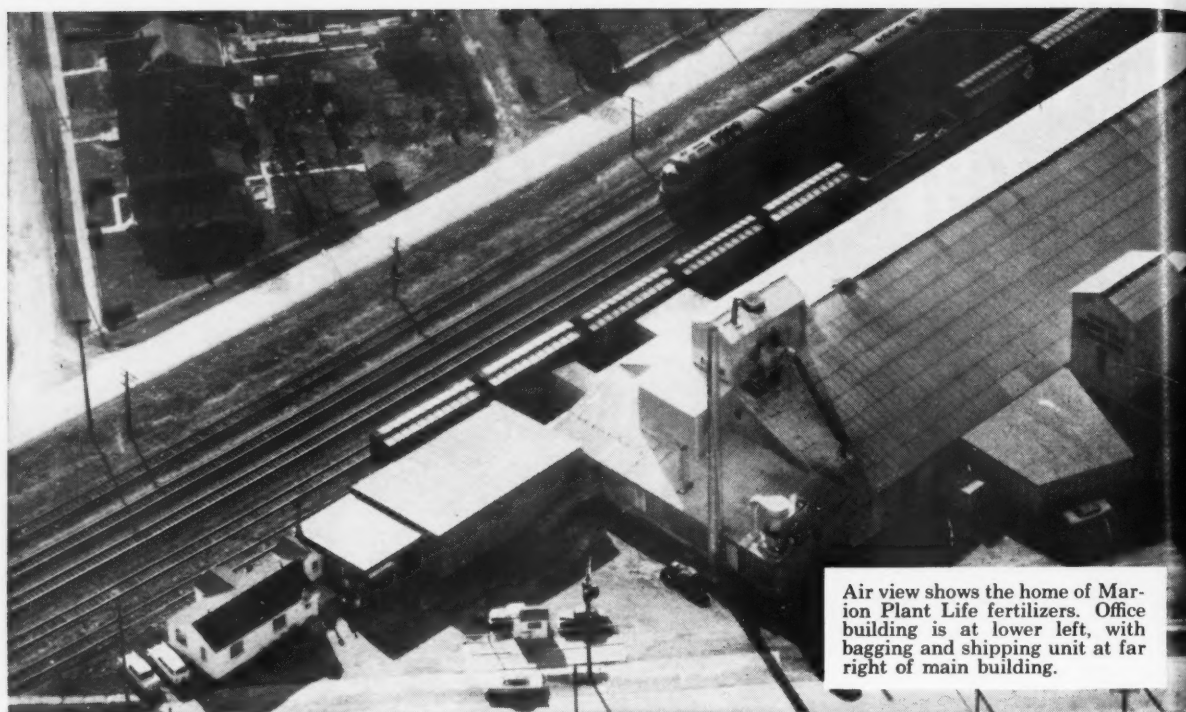
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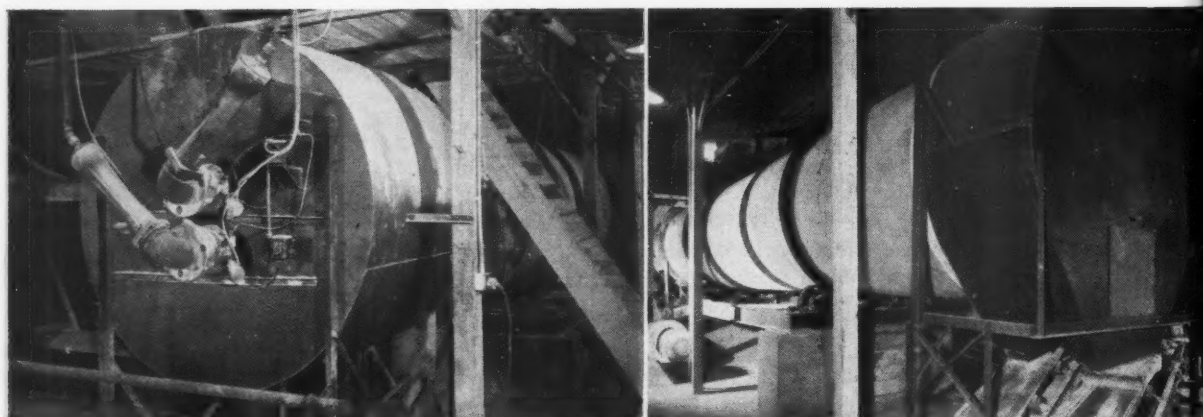
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TAMPA, FLA.—3737 Neptune St.
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Air view shows the home of Marion Plant Life fertilizers. Office building is at lower left, with bagging and shipping unit at far right of main building.

"We've found 4 big reasons for choosing International's Triple"

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- ✓ **high analysis triple—costs less per unit P_2O_5**
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- ✓ **dependable service**



Compact arrangement of plant features combustion unit in foreground with continuous-type ammoniator-granulator located above.

Drying and cooling units are located at ground level. Dryer extending from left is paralleled by a cooler located at the rear.



President George H. Alber supervises activities from this attractive office.

"That's why we schedule International's Triple Super"

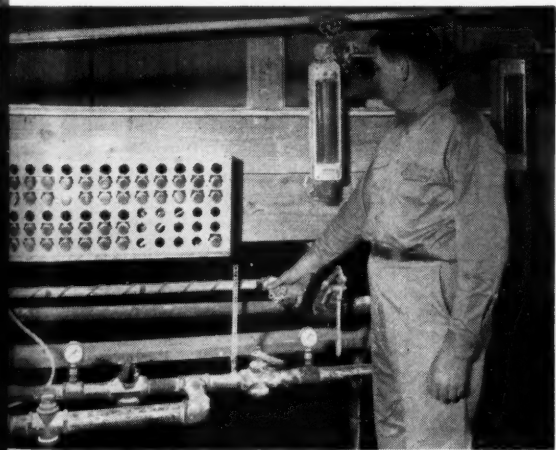
**says George H. Alber, President,
Marion Plant Life Fertilizer Co.,
Marion, Ohio**

People around Marion, Ohio, regard George H. Alber as an "unofficial pace-setter" for the fertilizer trade in that area. He organized the Marion Plant Life Fertilizer Co. in 1937 and serves as president of the company. In 1955 he switched all plant operations to granular fertilizers.

"We know what we're looking for in basic goods," says Alber. "Every ingredient must measure up to top quality standards. That's why we schedule International's Triple."

There's no secret about the choice. "We like the way it ammoniates... and the granular product we get. It's a high-grade phosphate that costs less per unit. And we can count on dependable service and delivery, any time."

These same benefits can be yours when you use International's superior quality Triple Super. Write or wire for full information.



Control panel operated by Plant Superintendent Fred Ioerger is located near ammoniator-granulator. Three men, including one man at controls, and foreman keep plant operating when "on stream."

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CALENDAR

Jan. 8-10. Northeastern Weed Control Conference, Hotel New Yorker, New York City.

Jan. 13-14. National Cotton Council of America, twentieth annual meeting, Westward Ho Hotel, Phoenix, Ariz.

Jan. 13-15. Joint meeting, Weed Society of America and Southern Weed Conf., Hotel Peabody, Memphis, Tenn.

Jan. 14-15. Georgia Plant Food Educational Society, annual meeting, University of Georgia, Athens, Ga.

Jan. 14-16. Nebraska Fertilizer, Machinery and Chemical Exposition, Pershing Auditorium, Lincoln, Neb. Sponsored by the Neb. Fert. Institute and the Neb. College of Agriculture.

Jan. 20-21. "Pest-O-Rama," sponsored by Alabama Assn. for Control of Economic Pests, State Coliseum, Montgomery, Ala.

Jan. 21-22. Illinois Fertilizer Industry Conference, University of Illinois, Urbana, Ill.

Jan. 21-22. 10th Annual Pesticide School, North Carolina State College, Raleigh, N. C.

Jan. 21-23. Calif. Weed Conference, San Jose, Calif.

Jan. 22-23. Northwest Agr. Chemicals Industry Conf., Hotel Benson, Portland, Ore.

Jan. 23-24. 10th Illinois Spray Operators' School, Univ. of Ill., Urbana.

Jan. 30-31. Colo. Agr. Chemicals Assn. Annual Meeting, Cosmopolitan Hotel, Denver, Colo.

Feb. 4-5. Second Annual Kansas insect and weed control conference, Kansas State College, Manhattan, Kansas.

Feb. 10-11. Southwestern Branch, Entomological Society of America, annual meeting, Shamrock Hilton Hotel, Houston, Texas.

Feb. 13-14. Agronomists-Industry Joint Meeting, Edgewater Beach Hotel, Chicago.

Feb. 20-21. Nitrogen Conf., Lowry Hotel, St. Paul, Minn. Sponsored by the Minn. Fert. Industry Comm. of the Midwest Soil Improvement Comm. and the Univ. of Minn.

Mar. 4-5. Western Cotton Production Conf., Hotel Cortez, El Paso, Tex.

April 22. Spring meeting, Western Agricultural Chemicals Assn., Hotel Biltmore, Los Angeles, Calif.

VIEWING WASHINGTON

with Farm Chemicals
Washington Bureau

on agriculture

Farm chemicals and fertilizer markets in 1958 are now expected to be at least as large as during the past year. Underwriting big sales is the prospect of record-smashing farm production forecast for the new growing season. Production during 1957 equaled the all-time high established in 1948 and repeated in 1956. With one of the biggest winter wheat crops in the making, resulting primarily from the best start in years, crop forecasters are confidently predicting even bigger total output in 1958—provided generally good weather prevails.

The farm price-cost squeeze also works toward greater farm interest in input items promising greater efficiency and bigger yields per acre. Economists hold out no hope that costs will level off this year, but on the contrary, are predicting higher farm costs across the board. Price supports at the lowest levels in years give further incentive for increasing production from available resources.

Costs of producing fertilizers and farm chemicals, as well as the price to farmers, also will be higher during the new year. In addition to probable higher labor costs in the industry, the latest cost-increasing factor is in transportation. Most of the nation's railroads have requested another increase in rates of the Interstate Commerce Commission. These increases affect many of the raw materials required in production of chemicals and fertilizers. The proposed cost of hauling fertilizers, and articles taking the same rates, would be increased one-cent per hundred-weight, or 20 cents a ton—except in the South where the increase application does not apply. Cost of transporting insecticides and fungicides would be increased 3 per cent across the board.

Corporate and personal income tax cuts talked earlier now are definitely out for 1958. From all indications, they will be continued at current levels for another year. After that, the odds are that personal income taxes will be increased—probably in 1959. The current tax outlook stems from the government's intention to speed up missile and satellite research and construction. The Administration is expected to ask Congress for an increase in the national debt ceiling—and also recommend an over-all budget breaking through the current fiscal year's record peacetime budget of \$72 billion.

Should industry continue selling fertilizer in the face of mounting agricultural surpluses? This question often comes up in view of the growing public pressure "to do something about agriculture." The answer, according to Dr. Russell Coleman, executive vice-president of the National Plant Food Institute, is a resounding "yes." Coleman says that while he is "in complete sympathy" with efforts to solve the

VIEWING WASHINGTON

agriculture continued

farm problems, "the most important challenge facing agriculture today is to use all its forces to see that technological advancements continue to be applied more quickly on the farm." Application of technology by farmers has resulted in savings to the consumer of about \$13 billion a year, says he, using USDA figures. The increasing use of fertilizer since 1940, according to Coleman, has saved the consumer at least \$2 billion of the total figure. Thus, farmers in a way, have "subsidized consumers," Coleman says, and adds that fertilizer use very definitely should be increased. Write Information Department, NPFI, for copies of the Coleman speech.

Watch for important changes in the Soil Bank's Conservation Reserve—they are likely to set a pattern for the farm programs of the future. USDA officials believe that if Congress will permit them to beef up the Conservation Reserve enough, it can be molded into the basic farm program. They feel that if it can be made attractive enough, through higher payment rates, upwards of 50 million acres could be retired from production during the next two years—and up to 15 million acres a year after that until output has been brought in line with demand. The basic Conservation Reserve program pays annual rent of an average of \$10 an acre for 3, 5 or 10 year periods, plus up to 80 per cent of the initial costs of installing conservation practices.

One significant change already has been made. The USDA has invited farmers in four "test" states—Maine, Illinois, Nebraska and Tennessee—to set their own asking price on putting entire farms into the Reserve for 5 to 10 years. Under the regular program, farmers in all states can put in less than whole farms and receive the government's offering price of \$10 an acre. If the experiment is successful, it will be spread to all states, and officials predict that it will attract a sizable number of farms into retirement.

Will the city vote write the farm laws of the future? This may be the most significant farm question Congress may answer during the current session. With farmers amounting to only 13 per cent of the total population, coupled with a badly-split "farm bloc," city representatives conceivably could ram through farm law changes regardless of farm needs or wants. What makes this a big issue this year is the publicity on the failure of present farm programs which cost the taxpayer a whopping \$5 billion annually. Secretary Benson has been hammering at consumer benefits to be derived from lower or no price supports—and may have aroused retail customers to the point at which their congressional delegates will want "satisfaction."

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Now, Du Pont offers a "Uramon" Ammonia Liquor containing ammonium sulfate. This new urea-ammonia solution, called UAL-S, combines two efficient forms of nitrogen with ammonium sulfate to provide added sulfur . . . an essential plant nutrient with recognized agronomic value.

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caking. In granular mixtures, UAL-S aids in producing good yields of hard, round, firm granules that store and distribute well.

UAL-S is safe—handles at moderate pressure and there's no danger of flash fires. It's non-corrosive to fertilizer manufacturing equipment, including mild steel and aluminum. UAL-S has a low freezing point, too . . . can be stored year round in most areas.

Du Pont specialists can give you at-the-plant advice on proper use of UAL-S in your fertilizer mixtures. They stand ready to assist you in profitably formulating mixtures containing UAL-S. For further information on UAL-S, and to request the services of one of Du Pont's specialists, write the nearest office.

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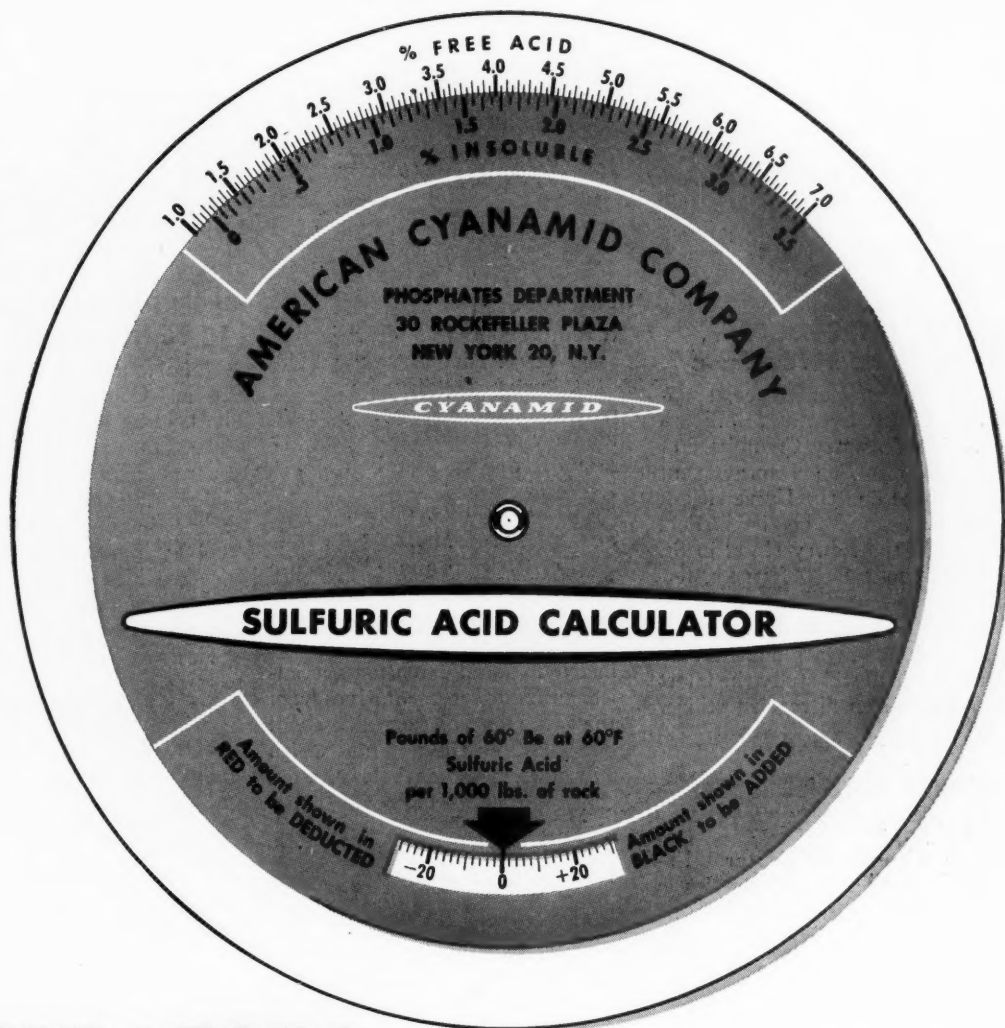


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Associations & Meetings

ST. PAUL NITROGEN CONF. EXPECTS 1,000 ATTENDANCE

A Nitrogen Conference, sponsored jointly by the Minnesota Fertilizer Industry Committee of the Midwest Soil Improvement Committee and the University of Minnesota, will be held Feb. 20-22, at the Lowry Hotel in St. Paul. About 1,000 farmers, fertilizer manufacturers, fertilizer dealers and soils research workers are expected to attend the conference which will study the latest information on nitrogen fertilizer use.

GEORGIA AGENCIES & NPFI LAUNCH PILOT PROJECT

The Georgia Agricultural Extension Service in six counties in cooperation with the Georgia Plant Food Educational Society, the National Plant Food Institute, and many local agencies report plans for a joint undertaking. It is a pilot project to test techniques and to evaluate the effectiveness of an intensified educational campaign to increase farm income through the more efficient use of fertilizer and lime. The Institute is helping to support the program through a grant of funds and also will share a substantial part of the cost of a comprehensive study to evaluate the results of the program.

Intensified work on fertilization will be made a part of the county agricultural program for the six counties. The program in these counties is a part of the \$200 million soil fertility program being promoted throughout the state, and will be extended to other counties as resources permit.

The primary objectives of the program are to make farmers and business leaders aware of the major roles fertilizer and lime play in building a better agricul-

tural economy in Georgia, to assist farmers in carrying out the best known fertilizer and lime practices, and to increase farm, industry and business income by sound fertilization methods.

N.C. PESTICIDE SCHOOL SET FOR JAN. 21-22

The 10th annual Pesticide School at North Carolina State College will be held Jan. 21 and 22. Twenty-two State College instructors and extension specialists and four representatives from the U.S. Dept. of Agriculture will participate in the program which will cover plant pathology, weed control, and entomology.

SOCMA ELECTS NEW OFFICERS

The Synthetic Organic Chemical Manufacturers Association re-elected R. Wolcott Hooker, senior vice president of Hooker Electrochemical Co., president of the organization at its 36th annual meeting, Dec. 4, in New York City. Also elected were Samuel G. Baker, general manager, Organic Chemicals Dept., Du Pont, first

vice president and Robert E. Hulse, executive vice president and general manager, chemical operations, U.S., Industrial Chemicals Co., second vice president. C. K. Egeler, eastern manager, pigment, color and chemical div., Sherwin-Williams Co., was re-elected treasurer.

INSECT CONTROL CONF. TO BE HELD IN MISS.

The fourth annual Mississippi Insect Control Conference will be held at Mississippi State College, Jan. 9-10. Topics to be discussed include the latest research information on field crop and livestock insects, the hazards involved in use of insecticides, including highest allowable insecticidal residues, and the uses of systemics and phosphate insecticides.

ACS NAMES DIV. HEADS

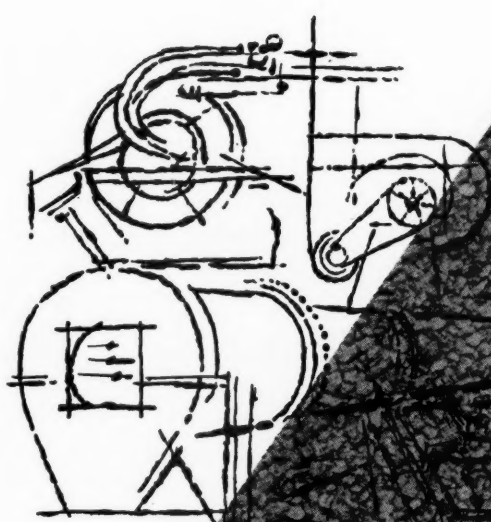
Dr. H. Haller, assistant to the administrator of production research in the USDA's Agricultural Research Service, and Dr. William Albert Zisman, head of the Surface Chemistry Branch of the Naval Research Laboratory, will head divisions of the American Chemical Society during this year.

Haller has been elected chairman of the Society's Division of Agricultural and Food Chemistry while Zisman has been named chairman of the ASC Division of Colloid Chemistry.

VERNON GORNTO HONORED FOR SAFETY WORK

Vernon Gornto, past general chairman of the National Safety Council's Fertilizer Section, receives a plaque for his valuable work in the safety field. Presentation was made by Ed Burroughs, immediate past general chairman, on behalf of the section's Executive Committee.





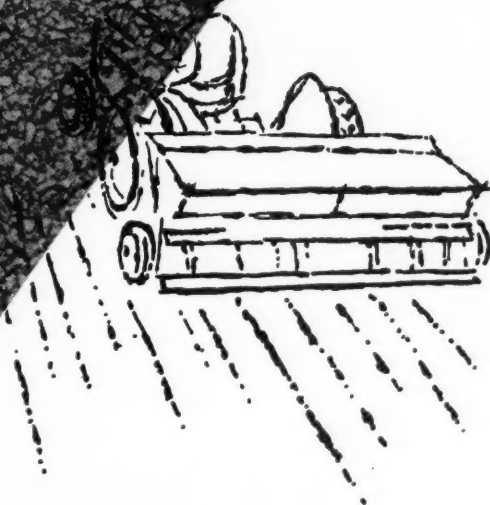
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Arcadian[®] News

Volume 3

For Manufacturers of Mixed Fertilizers

Number 1

EFFICIENT OPERATION PAYS IN MIXING GRANULAR GOODS

Methods for Safeguarding Profits and Plant Safety

Careful cost accounting is a money-saving practice in any business. By the same token, it will pay you to keep a constant and efficient check on the methods and materials you utilize in manufacturing granular fertilizers and high-analysis mixed goods. Such a practice not only saves money, it also serves as a safeguard in maintaining a good safety record in the mixing operation.

Avoid Waste to Save Money

Maintaining top efficiency in the mixing operation for making high-analysis fertilizers keeps costs down by avoiding waste of acid and nitrogen. At the same time it greatly reduces danger of fires, hot spots and other hazards.

Even without acid, a big tonnage of high-analysis fertilizer is being manufactured by using the correct nitrogen solution to get a high ammoniation rate for superphosphate through proper mixing. Addition of sulphuric or other acid is often required to obtain desired fertilizer condition. The acid neutralizes ammonia and holds more nitrogen for high analysis. It also produces the high temperature and low water content required for proper granulation.

With the use of acid, any inefficiency in mixing immediately becomes expen-

sive and hazardous. Either with a batch mixer or a continuous ammoniator, skillful operation is needed to do a good, low-cost job of mixing acid, solutions and dry materials. The spray pipes for acid, solutions, and water if needed, should be separate and in good condition. The rotating flights in the mixer must be kept clean. And the timing of the entry of all materials must be correct. Such a mixing operation can produce fertilizer with very little waste of acid or nitrogen, and with hardly any fumes and no hot spots.

Inspect Spray Pipes Daily

Perhaps the biggest drawback in otherwise excellent equipment is the difficulty involved in changing spray pipes. Careful checking and replacement of the spray pipe that introduces nitrogen solution into the mixer always pays well. Even more careful checking is needed for the spray pipe that introduces acid into the mixer. Daily inspection is best. Some acid pipes have been known to last only 3 or 4 days before losing their good acid distribution pattern. When the meters show an excessive use of acid, the spray pipes should always be examined.

The most modern continuous ammoniator is no guarantee of low acid and

nitrogen costs if it is not skillfully operated. Likewise, an old batch mixer, if carefully operated, can do a good job of producing high-analysis goods.

Ask Nitrogen Division

To keep costs down, and to prevent hot spots or fires in the mixer, the main essentials are good operating skill, spray pipes with a good distribution pattern, and proper amounts of acid and the right ammoniating solution. In some mixing operations, skillful handling of the right high-ammonia solution can produce good quality and condition without using acid.

With the wide variety of equipment, plant food ratios, and analyses in common use today, many different ammoniating solutions are required for efficient and economical mixing. Nitrogen Division has the broadest line of nitrogen solutions and experienced technical people to help you get the best results possible with your equipment and production program. Ask the Nitrogen Division technical service man to help you pick the right solutions for your operation. His services are available to customers at no cost. For prompt technical help, write Nitrogen Division, Allied Chemical, 40 Rector Street, New York 6, N. Y. Telephone: Hanover 2-7300.

Boom in Irrigation Opens a Big Fertilizer Market

**TONNAGE
OPPORTUNITIES**

Severe drouths of the past several years have made farmers everywhere take to watering crops. And there's no better place for a fertilizer salesman than a new irrigation area. With the biggest yield-limiting factor, shortage of water, taken care of, the next big limiting factor shows up strong. That is lack of enough fertilizer. Put water and fertilizer together and yields shoot up.

Water alone doesn't make a succession of big crops. The situation with water and fertilizer is like the old riddle about the hen and the egg. It is not really important which came first, but it is mighty important that you have both.

Too many farmers waste irrigation water by not feeding their crops enough fertilizer to take advantage of the new water supply. The first year a farmer irrigates, he may get a big increase in crop yields due to the plant food reserves in the soil. Then his yield drops off, unless he goes to see his fertilizer dealer, or his dealer comes to see him.

In Nebraska, for example, many corn growers are getting only 60- and 70-bushel yields with irrigation. Yet these same fields with enough fertilizer are producing 125-bushel yields with plenty of water. The 1956 winner in the state corn contest produced 208 bushels of corn per acre by using enough water and plant food.

One Iowa farmer lost his unfertilized 1952 corn crop because of drouth. In dry 1953, 4 inches of sprinkler irrigation gave him 65-bushel corn, while his dry-land corn produced 30 to 35 bushels. Then, in 1954, sure of a water supply from the nearby river, he used 8 inches of water plus fertilizer. One corner of the field that was missed by the sprinkler didn't produce an ear. But the rest of the field averaged 90 bushels per acre. Even in years of normal rainfall, he had never before gotten more than 70 bushels of corn per acre.

The story of teamwork between fertilizer and water is the same everywhere. In Alabama, irrigation alone failed to improve the yield of Dallis grass pasture. But 600 pounds of fertilizer per acre, plus irrigation, increased the yield 3 tons per acre dry weight. Unirrigated cotton yielded only 1,900 pounds of seed cotton per acre. Water and 240 pounds of nitrogen increased the yield to 5,000 pounds of seed cotton per acre.



Irrigated plots, with and without fertilizer, are excellent sales builders for fertilizer, the sure way to show that crops need more fertilizer when they get more water. By picking a soil that is not loaded with plant food at the start, you can dramatize the need for fertilizer.

Balance is Important

Balance between water and fertilizer is just as important as balance between nitrogen, phosphorus and potash. Many farmers learn this only by seeing disappointing yields from their first or second try at irrigation. Whether the water comes from irrigation or from extra good rains or deep soil moisture, the result is the same. No crop can produce much extra growth from water if it lacks soil fertility. This is shown by Missouri corn fertilization tests in a year with only 5 inches of rain during the growing season. Deep subsoil moisture was good. Unfertilized corn produced only 18 bushels per acre and extracted moisture from a 2-foot depth of soil. This crop used 21,000 gallons of water per bushel harvested. Corn with adequate fertilizer drew moisture from a 5-foot depth of soil and produced 79 bushels per acre. With enough plant food to make use of moisture, this corn used only 5,600 gallons of water per bushel.

Likewise, 3 years of tests in New York State showed that "high-fertilization" hay and pasture consistently out-yielded irrigated plots with "normal-

fertilization." A 5-year Illinois test of pasture irrigation without fertilizer showed that the small increase in beef production did not pay for the irrigation.

Irrigation is on the increase everywhere that farmers can build ponds, dig wells or pump from streams. For high-value, intensive crops that are always highly fertilized, irrigation almost always pays well, even in short dry spells. For field crops and pastures, water provides profits in proportion to the fertilizer used.

How big is the irrigation market? In the West, where irrigation first grew big, there has been about a 10% increase in watered acreage since 1954. Water supplies have been the biggest limiting factor. Nebraska alone has 2 million irrigated acres today.

In the humid East, irrigation was so unimportant until recently that no census data were kept for the 28 Eastern states. But the long-time weather records show that even in most of this area, which has 30 inches or more rainfall in normal years, drouth periods are long enough most years to make supplemental irrigation produce profitable yield increases. Farmers are finding this out. In 1939, the 28 Eastern states had about 39,000 irrigated acres. By 1954, this had increased to 546,000 acres. The latest figures show 650,000 acres are irrigated in the East. Everywhere that water is put to work in irrigation, it is building new fertilizer markets. It will pay you to follow the water to the fields!

Promote Better Pastures to Sell More Fertilizer

Pastures and meadows are the stepchildren in the farm crop family, when it comes to fertilizer use. Our starved and sod-bound grasslands should be a big market for fertilizer. We have 984 million acres of hay and pasture land, compared to 335 million acres in tilled crops. How do we spread the word that it pays to spread fertilizer on grass?

When a farmer fertilizes corn or wheat, he sees the results in more bushels at harvest. When he tries a little fertilizer on pasture, the results are hard to see. Cows graze away the evidence. And he cannot easily measure the extra milk or meat produced.

Grass is a lot of different crops that require different kinds of management. Orchard grass has to be handled differently than blue-grass or timothy. Reed canary grass is nothing like fescue or wheat-grass. Coastal Bermuda grass is quite another thing than common Bermuda grass. Farmers say grass crowds out legumes, but legumes sometimes appear to crowd out brome grass. The wrong timing of grazing and harvesting often diminishes the benefits that fertilizer provides.

How is it then, that some farmers use 500, 1000 pounds or more fertilizer per acre to make grasslands pay well? Several basic principles help them make money on grass. They use new seeding methods to establish good stands. They

use deep-rooted grassland crops that make good use of more fertilizer. They manage their grasslands for a longer producing season. They aim to have animals per acre instead of acres per animal. On arid rangeland, this won't work. But anywhere grass gets enough water to produce one ton of feed per acre under ordinary management, fertilizer can produce extra tons of profit-building feed. The fertilizer dealer can profit by dramatizing the large yields produced with plenty of fertilizer.

It is important, when grass is liberally fertilized, to cut or feed it while young. There is greater feed value in young grass—more protein, more vitamins, more palatability. And the next cutting comes along sooner. A 1,000-pound dairy cow will eat 105 pounds of lush pasture per day, while she will eat only 80 pounds of average fertilized pasture or 60 pounds of poor pasture. A cow will eat 2½ pounds of young-cut hay for every 1½ pounds of poor, late-cut hay she will chew down.

Continuous Grazing

Good farmers grow several different pasture crops to get a sequence of grazing over the growing season. Top-dressing with fertilizer several times a year also helps produce a long pasture season.

Where legumes do not thrive, grass can make big yields of feed rich in protein. Fall application of mixed fertilizer plus heavy nitrogen top-dressing in late spring makes amazingly big hay crops. And the crude protein content of such hay may go up to 16 or 20%. One New Jersey test produced one ton of protein per acre in grass hay. The late spring application of high-nitrogen fertilizer, just a few weeks before harvest, moves directly into building high protein content in the first cutting of hay. Such a program has produced 4 tons of 20% protein hay per acre.

New varieties of deeper-rooted grasses are capable of using high rates of fertilizer to push out really big yields of low-cost forage. In the South, for example, Coastal Bermuda grass is producing 10 to 12 tons of dry-weight forage per acre. Florida results with Bahia and Pangola grass show 20 extra pounds of dry forage produced for every extra pound of nitrogen in fertilizer.



Georgia and Texas report 700 pounds of beef per acre of high-yielding, well-fertilized grass.

Farther north, fescues, orchard grass, brome, Reed canary grass and other vigorous varieties are well able to use large amounts of fertilizer to produce big yields of forage. Farmers often complain about sod-bound grass that produces little feed. Small amounts of fertilizer make little improvement. But heavy applications of fertilizer make yields jump.

In North Dakota and Minnesota, for example, sod-bound brome and crested wheat grass were producing only one ton of hay per acre. Fertilizer application, including 30 pounds of nitrogen, boosted yields to 2½ and 3½ tons per acre. In Missouri, rough, hilly, erosion-prone land seeded to fertilized grass and legumes is producing as much feed as good bottom land.

How do you measure hay and pasture profits from fertilizer? Bales of hay per acre are easy to measure. Pasture cow days per acre, beef and milk gains per week, extra days or weeks of grazing take effort to measure. They are seen best by the farmer who likes to keep records. And there are reams of records of pasture profits made with fertilizer.

It will pay you to obtain all available information applicable to your sales territory and use it to aggressively spread the word that proper management and plenty of fertilizer make pastures highly profitable. Pastures are a big tonnage opportunity for fertilizers.



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Arcadian®

When you purchase your nitrogen requirements from Nitrogen Division, Allied Chemical, you have many different nitrogen solutions from which to select those best suited to your ammoniation methods and equipment. You are served by America's leading producer of the most complete line of nitrogen products on the market. You get technical assistance and formulation advice from the largest and most efficient staff of nitrogen experts. You benefit from millions of tons of nitrogen experience and the enterprising research that originated and developed nitrogen solutions.

NITROGEN SOLUTIONS

	CHEMICAL COMPOSITION %					PHYSICAL PROPERTIES			
	Total Nitrogen	Anhydrous Ammonia	Ammonium Nitrate	Urea	Water	Neutralizing Ammonia Per Unit of Total N (lbs.)	Approx. Sp. Grav. at 60°F	Approx. Vap. Press. at 104°F per Sq. In. Gauge	Approx. Temp. at Which Salt Begins to Crystallize °F
NITRANA®									
2	41.0	22.2	65.0	—	12.8	10.8	1.137	10	21
2M	44.0	23.8	69.8	—	6.4	10.8	1.147	18	26
3	41.0	26.3	55.5	—	18.2	12.8	1.079	17	-25
3M	44.0	28.0	60.0	—	12.0	12.7	1.083	25	-36
3MC	47.0	29.7	64.5	—	5.8	12.6	1.089	34	-30
4	37.0	16.6	66.8	—	16.6	8.9	1.188	1	56
4M	41.0	19.0	72.5	—	8.5	9.2	1.194	7	61
6	49.0	34.0	60.0	—	6.0	13.9	1.052	48	-52
7	45.0	25.3	69.2	—	5.5	11.2	1.134	22	1
URANA®									
10	44.4	24.5	56.0	10.0	9.5	11.0	1.108	22	-15
11	41.0	19.0	58.0	11.0	12.0	9.2	1.162	10	7
12	44.4	26.0	50.0	12.0	12.0	11.7	1.081	25	-7
13	49.0	33.0	45.1	13.0	8.9	13.5	1.033	51	-17
15	44.0	28.0	40.0	15.0	17.0	12.7	1.052	29	1
U-A-S®									
A	45.4	36.8	—	32.5	30.7	16.2	0.925	57	16
B	45.3	30.6	—	43.1	26.3	13.5	0.972	48	46
Anhydrous Ammonia	82.2	99.9	—	—	—	24.3	0.618	211	—

**Other ARCADIAN® Nitrogen Products: UREA 45 • A-N-L® Nitrogen Fertilizer
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Indianapolis 20, Ind., 6060 College Ave. Clifford 5-5443
Kalamazoo, Mich., P. O. Box 869.....Kalamazoo 5-8676
St. Paul 4, Minn., 45 N. Snelling Ave.....Midway 5-2864
San Francisco 4, Cal., 235 Montgomery St. Yukon 2-6840

Chemicals

1—FERTILIZER PLACEMENT

"Fertilizer Placement," an attractive 40-page booklet has been issued by the American Potash Institute. The booklet, copiously illustrated, capsules the latest efficient placement methods for row crops, methods to get best use from fertilizer, what the specialists say, and the trend from split boot to single band placements. For your copy

CIRCLE 1 ON SERVICE CARD

2—HAZLETON LABS. ISSUES BOOKLET

Hazleton Laboratories, Inc., has issued a handsome, two-color brochure on its services, types of research, and facilities.

The company, established in 1946, conducts research on chemical ingredients in many consumer goods ranging from sprays used on apples, to cosmetics and food dyes, to evaluate their effects on biological systems. A copy of the booklet may be secured by

CIRCLING 2 ON SERVICE CARD

3—INDULIN BULLETIN

A new 20-page technical bulletin on Indulin, surfactant, extender, dispersant, re-infort, binder, sequestering agent, emulsifier stabilizer, and protective colloid, has been issued by the Polychemicals Division of the West Virginia Pulp and Paper Co. The bulletin describes Indulin's usage and illustrates its properties in aqueous and solvent systems. It may be obtained by

CIRCLING 3 ON SERVICE CARD

4—COMPANY GROWS FROM 3 TO 1200

Callery Chemical Co., which has grown from a research group of three in 1948 and 1949 to an organization of 1200, has outlined its growth and potential in a 12-page

FREE INFORMATION to help you
solve fertilizer, pesticide problems

Reader Service

illustrated booklet. Copies of the booklet, which also presents the company's two new production facilities under construction, may be obtained by

CIRCLING 4 ON SERVICE CARD

5—C & E LISTS PRICES

Crippen & Erlich Laboratories, Inc., a subsidiary of Foster D. Snell, Inc., recently issued its price list for organic chemical analyses, physical tests, and comprehensive analyses and tests. The firm states that its laboratory can undertake special projects in most organic chemical fields. In application research, it can investigate new compounds in many fields including insecticides, fungicides, and agricultural chemicals. Copies of the price list may be secured by

CIRCLING 5 ON SERVICE CARD

6—COPPER SULPHATE PRODUCTION

The Republic Chemical Corp., manufacturers of Copper Sulphate, has issued a booklet describing in detail the methods used to produce the chemical in a modern plant. The booklet also gives statistics as to the quantities used in industry, agriculture, and export, descriptions of its usage, and other material. For your copy

CIRCLE 6 ON SERVICE CARD

markedly different schemes of use—batching and continuous,

CIRCLE 8 ON SERVICE CARD

9—NEW LITERATURE ON CHROMATOGRAPHS

Beckman's Scientific Instruments Division has issued three new sheets on its Gas Chromatographs. The literature deals with the properties of Beckman GC-1, for routine laboratory separation and analysis of gases and liquids boiling up to 80° C; Beckman GC-2 for thousands of routine laboratory analyses of gases boiling up to 350° C; and the complete line of sampling accessories and column information that extend the range of applications of both instruments. Obtain your copy by

CIRCLING 9 ON SERVICE CARD

10—A-C DESCRIBES COMPACTING MILL

A new bulletin released by Allis-Chalmers describes its compacting mill. Designed to provide a low-cost, mechanical means for converting or upgrading particle size and for controlling product density and product solubility factors, the mill is the heart of Allis-Chalmers compacting process.

For your copy of the bulletin, which also makes reference to other Allis processing equipment, just

CIRCLE 10 ON SERVICE CARD

11—LAB. PELLET MILL

The Pellet Mill Division of Sprout, Waldron & Co., has developed a new laboratory pellet mill. The company states that the mill exactly reproduces the end results to be anticipated from high production pelleting machines, enabling researchers to complete studies on many application involving pelleting and to project operating methods and costs. For further details

CIRCLE 11 ON SERVICE CARD

12—COMPLETE DATA ON SILENT CHAIN DRIVES

Link-Belt Co. has compiled a comprehensive 88-page book on silent chain drives. The chain's versatility—it ranges

Process Equipt.

7—FLOW INSTRUMENTS

The new instrument division of Schutte and Koerting has published Bulletin M-1 which pictures and briefly describes the division's line of precision instruments for measuring, indication, recording, and controlling the rate of flow of all types of fluids. The bulletin may be obtained by

CIRCLING 7 ON SERVICE CARD

8—FULLER AIRMERGE BLENDING SYSTEM

A four-page, two-color bulletin describing Fuller Co.'s Airmerge System, a new means of blending pulverized materials in a silo through quadrant aeration, has been issued.

For more information on the System which is principally capable of two

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from tiny fractional horsepower drives used in small power tools to huge drives transmitting thousands of horsepower—is detailed. The book also contains tables of service factors, ratings, chain length and center distance computations. For a copy

CIRCLE 12 ON SERVICE CARD

13—FORGED STEEL UNIONS

A 16-page three-color booklet containing a variety of practical tips and information on forged steel production has been issued by Clayton Mark & Co.

The brochure, "What Makes a Good Union," may be secured by

CIRCLING 13 ON SERVICE CARD

Packaging

14—FILLING MACHINE OPERATING MANUAL

Hope Machine Co. has released an operating manual on its two line filling machine Type 19S. The 36-page booklet contains 16 exploded view drawings, detailed operating instructions and points on maintenance, plus a parts list. To receive the booklet,

CIRCLE 14 ON SERVICE CARD

15—BOXING BOOKLET

Hinde & Dauch has just published a 24-page booklet, "How to Ship More Economically in Corrugated Boxes." Information is given on the designing, testing, and storing of product packages and on the planning of the shipping department.

A copy of the booklet will be sent if you

CIRCLE 15 ON SERVICE CARD

Materials Handling

16—CLARK CONTAINER HANDLER

A four-page, two-color brochure describing the construction and application of a device for handling collapsible containers has just been published by the Industrial Truck Division of Clark Equipment Co. The unit is designed to lift and carry the "Sealdbin" containers developed by United States Rubber Co. for bulk handling of flowable solids. For details,

CIRCLE 16 ON SERVICE CARD

17—COMPARISON CHART

A comparison chart on electric fork trucks is being offered by Lewis-Shepard Products, Inc. The chart enables users to survey simultaneously the operating, design and maintenance characteristics of three different trucks by filling in appropriate categories. After noting the various specifications of each truck, the purchaser can then weigh the features and systematically select the proper unit for his requirements. For copies of the chart,

CIRCLE 17 ON SERVICE CARD

18—NEW ROTARY CAR DUMPER

Heyl & Patterson, Inc., has developed a new rotary car dumper which is capable of handling hopper and gondola cars. The dumper is equipped with two clamps which hold the car secure without the use of counterweights.

For a copy of the company's 16-page brochure on the product,

CIRCLE 18 ON SERVICE CARD

Miscellaneous

19—GLOVE GUIDE

Mine Safety Appliances Co. is offering a guide in selecting glove material that best resists the many oils, solvents, and chemicals that are commonly used in industrial plants. The company has also announced a new line of gloves made of five molded materials. For a copy of the company's guide,

CIRCLE 19 ON SERVICE CARD

20—OPTICAL AIDS CATALOGUED

Edmund Scientific Co. has issued an 80-page catalog carrying over 1,000 optical items. Optical aids used by industry, research labs, production and design engineers, and scientists are among the products listed. The catalog may be had by

CIRCLING 20 ON SERVICE CARD

21—SAFETY CLOTHING COMPARISON

Milbourn Co. has published a six-page booklet which offers comparisons of chemical resistance and safety factors of nine families of synthetic fabrics and films

available in the company's safety clothing. Information includes the fabrics' resistance to inorganic and organic acids, alkalis, salts and solvents, at varying concentrations and temperatures. To receive a copy,

CIRCLE 21 ON SERVICE CARD

22—SOILTEST INITIATES NEW PUBLICATION

Last month, Soiltest, Inc. published the first edition of its quarterly "The Testing World." Among the items in December's issue is reference to report on soil testing written by J. W. Lyons of the Research Dept. of Monsanto Chemical's Inorganic Chemical Co. which was published in the Engineering News-Record.

Those wishing to subscribe to the publication should

CIRCLE 22 ON SERVICE CARD

23—WHEELABRATOR ISSUES CONDENSED CATALOG

A 32-page illustrated catalog covering the company's entire line of airless blast cleaning machines as well as wet blast, air blast and dust control equipment has been announced by Wheelabrator Corp.

Listed for the first time is Wheelabrator's new line of Super Tumblasts, a heavy-duty, high efficiency batch-type centrifugal blast cleaning machine, available in three sizes. The catalog also contains reference to specific literature covering each of the individual pieces of equipment. For a copy of the catalog,

CIRCLE 23 ON SERVICE CARD

24—WROUGHT IRON DATA

An 8-page booklet "Wrought Iron O.D. Piping," documenting more than a score of typical commercial and industrial wrought iron pipe installations has been issued by A. M. Bryers Co. The booklet may be obtained by

CIRCLING 24 ON SERVICE CARD

How to use the READER SERVICE CARD

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- Print or type your name, position, company and address,
- Clip and mail the Service Card.

See page 49 for information on these
Reader Service Numbers:

25—Spray Nozzle Tip

26—Towmotor Lift Truck

27—Portable Bagging Scale

VICTOR CO. FOUNDER HONORED AT CONF.

August Kochs, founder and corporation chairman of the Victor Chemical Works, was honored at the banquet ending the Seventh Semi-Annual Meeting and Winter Conference of the Manufacturing Chemists' Association held late in November at New York City.

President of the firm from 1910-47 and chairman of the corporation since, Kochs was presented with a framed resolution citing his accomplishments.

NPFI RESEARCH GRANTS GO TO THREE SCHOOLS

The Agricultural Experiment Station of the University of Kentucky, the Davis campus of the University of California, and Oregon State College have recently received grants from the National Plant Food Institute.

The \$6,000 grant to the Kentucky institution will be used for a three-year chemical plant food study project, to be directed by E. C. Doll, agronomist.

At California University, a research assistantship for fertilizer studies has been established. Three annual grants of \$3,000 each will support a study of the basic principles involved in the interrelationships of soil, moisture, and fertilizer.

The one-year \$2,100 grant to Oregon State College will be used to conduct an economic study of fertilizer use. Dr. W. G. Brown, assistant professor in agricultural economics, will supervise the research.

FERTILIZER CONTROL GROUP OFFERS PUBLICATION

The Association of American Fertilizer Control Officials has announced that its Official Publication No. 11 is available at \$2.00 per copy (discounts in lots of 100 or more). Copies may be secured through B. D. Cloaninger, secretary treasurer, P. O. Drawer 392, Clemson, S. Carolina.

AGRIC. WRITERS HONORED AT EDITORS MEETING

The Soil Builders Award for Editors plaques were presented to Ralph D. Wennblom, associate editor of the FARM JOURNAL, and the staff of the GEORGIA FARMER for their outstanding work in agricultural journalism. The plaques were given by the National Plant Food Institute at the annual meeting of the American Agricultural Editors's Association, held in Chicago last month. The Institute annually sponsors



Tom Anderson, publisher of the "Georgia Farmer," and Ralph D. Wennblom, associate editor of the "Farm Journal," receive NPFI's "Soil Builders Award for Editors" plaques from Louis H. Wilson, Institute secretary and director of information.

the award in a nationwide contest in cooperation with the AAFA.

Tom Anderson, publisher of the GEORGIA FARMER, accepted the award on behalf of his staff, winner in the category of magazines with less than 300,000 circulation. Wennblom was honored as the winning writer among magazines with more than 300,000 circulation.

WACA SCHEDULES SPRING MEETING

The Western Agricultural Chemicals Association will hold its spring meeting April 22, at the Hotel Biltmore, Los Angeles, Calif.

Speakers and their topics include: Dr. Boysie E. Day, assistant plant pathologist, citrus experiment station, University of California at Riverside, "Weed Control: Promising New Chemical Compounds"; J. Earl Coke, vice president, agriculture, Bank of America, San Francisco, "Western Agriculture: A Look at the Future"; and Dr. J. T. Thurston,

assistant general manager, Phosphates & Nitrogen Div., American Cyanamid Co., "Agricultural Chemicals Research in Basic Industry."

CALIF. FERTILIZER ASSN. AWARDS SCHOLARSHIPS

The Soil Improvement Committee of the California Fertilizer Association has awarded four \$100 cash scholarships to students in the Crop Production and Soil Science Departments of California State Polytechnic College.

Winners at the San Luis Obispo campus were Laurence L. March, Santa Cruz, and Wayne B. Sheldon, Sebastopol, Calif.

The awards for the Kellogg-Voorhis (Pomona) campus went to Donald J. Reid, Norwalk, and Richard Lee Walton, Santa Ana.

The association awards four scholarships annually.

TEXAS A & M CLUB WINS ASA AWARD

For the second time, the Texas A & M Student Agronomy Society was cited as the "Best Student Agronomy Club in the United States," by the American Society of Agronomy. An award was presented to the group at the ASA's annual banquet in Atlanta, Ga., in November. In 1952, the Texas club won the first annual contest conducted by ASA.

In addition to receiving the trophy, the club received a check from the National Plant Food Institute in the amount of \$100.

Dr. A. R. Midgley, head of the Dept. of Agronomy, University of Vermont, headed the committee in charge of the 1958 contest.

William Wayne Allen, president, Texas A & M Student Agronomy Society, holds ASA award. Dr. A. G. Norman, president, ASA, and Dr. W. H. Garman, chief agronomist, NPFI, offer congratulations.



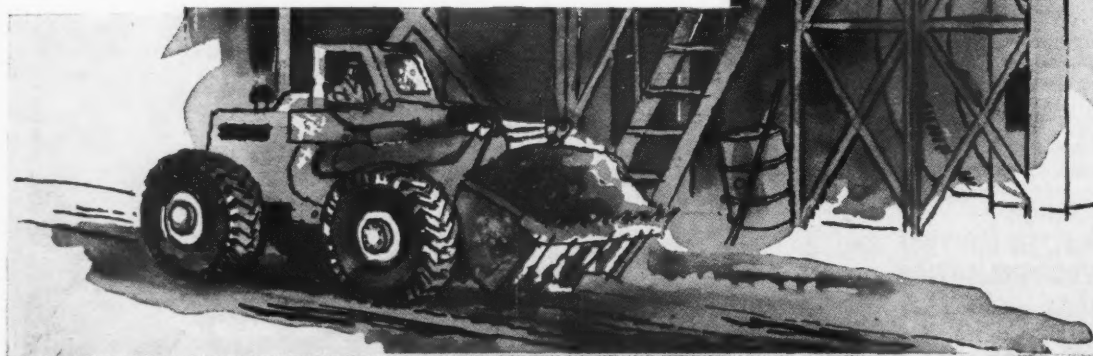
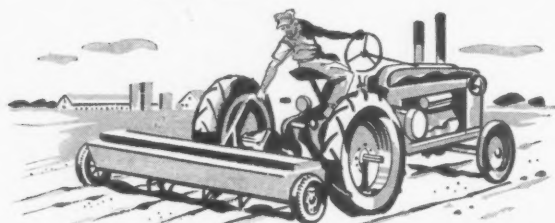
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REDUCES WEAR IN YOUR MIXING EQUIPMENT WHEN ADDED TO YOUR FERTILIZER

GRAFLOW is a conditioning agent for fertilizer that is paying for itself many times over in efficiently operated fertilizer plants. Added, as an ingredient, in either pulverized or granular form, GRAFLOW substantially reduces corrosion of the equipment in the mixing cycle. GRAFLOW reduces caking, and it increases flowability of your product.

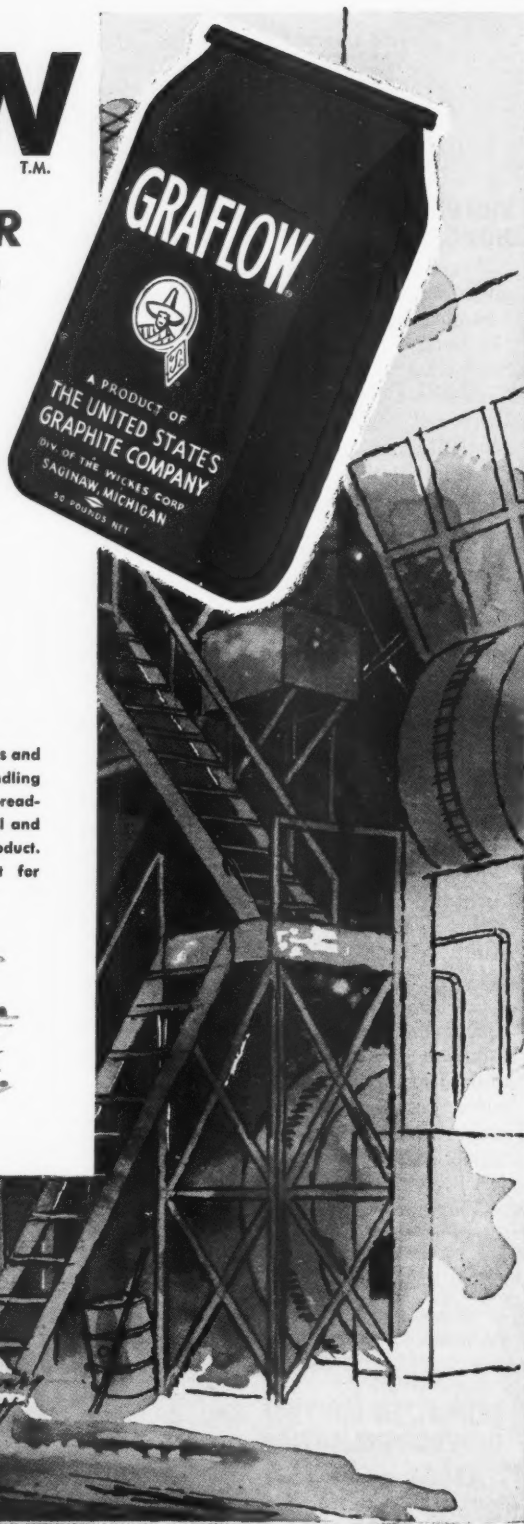
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GRAFLOW is basically one of nature's finest lubricants and coating agents. Because it so greatly improves handling and reduces wear and corrosion in farm-fertilizer-spreading-equipment, GRAFLOW can provide an additional and effective sales and advertising advantage to your product. Write to our Chemical Development Department for complete information.



GA 241-1

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A REPORT FOR YOU ABOUT Hi-D[®] AMMONIUM NITRATE

DEALERS PREFER Hi-D

"The rapid acceptance and demand for Hi-D was amazing."

"Hi-D is a better product in good bags."

"Arrived in better shape and stored better for a longer period."

"First time farmers have ever specified a brand of ammonium nitrate."

"Hi-D bags stand out well in warehouse. Farmer notices them as soon as he walks in."

"We've had really good reports about the product from our Hi-D customers."

"When farmers asked for ammonium nitrate, we sent them Hi-D. We were surprised at the number who insisted on Hi-D when they re-ordered."

"The spring advertising campaign sure built farmer recognition for Hi-D."

FARMERS PREFER Hi-D

"Really prefer the Hi-D granules in our field machinery over other kinds of ammonium nitrate."

"The men all like the way Hi-D handles. Hi-D throws nicely. What we don't use at once stores very well."

"Best moisture-proof bag I've ever seen. Used Hi-D on coastal Bermuda grass and corn, plus oats and rye in winter. A really free-flowing material, you never get too much or too little. Hi-D is always in good condition even after storing."

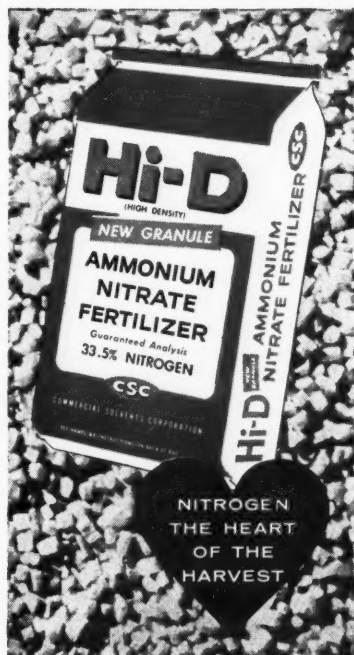
PILOTS PREFER Hi-D

"Hi-D arrives dry and stays dry. Flows evenly from start to finish. Plane hopper holds up to 25% more material. Saves me air time."

"More pounds of Hi-D in the hopper saves air time. Really flows nice. Fly at 30 feet with prills, 36 feet with Hi-D which means fewer times through a field, more profit per job."

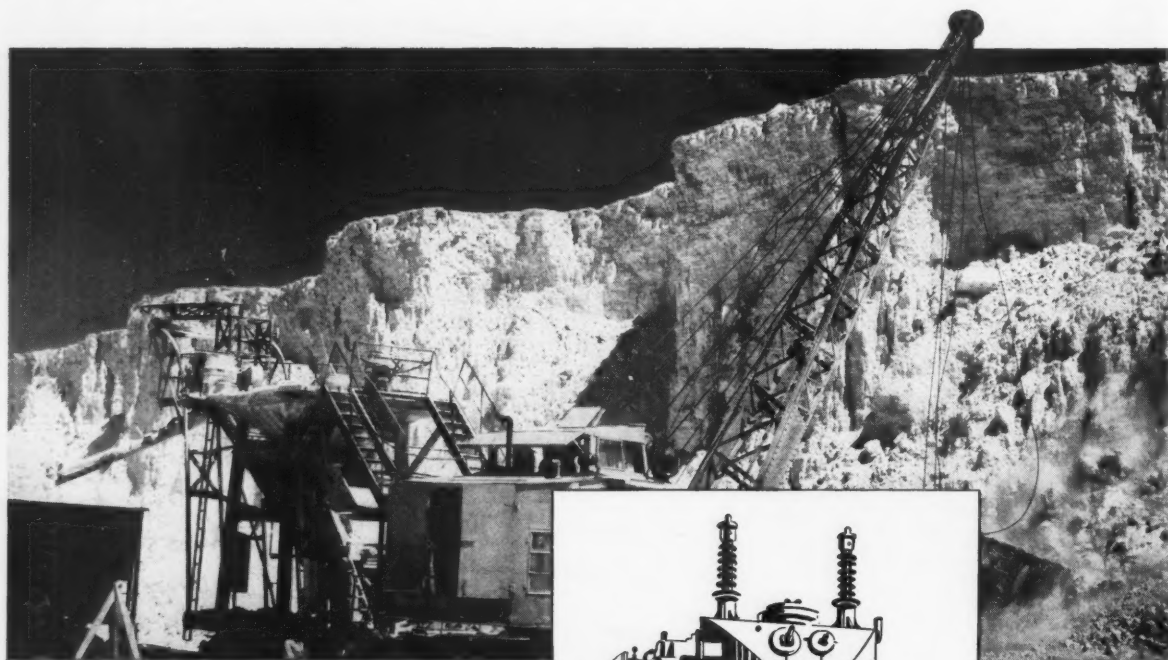
"Hi-D is always dry when we open it. Flows regularly from start to finish—no bridging in the hopper. Shuts off fast. No bind due to dust."

**IT'S EASY TO SEE THAT
IT'S EASIER TO SELL Hi-D!**



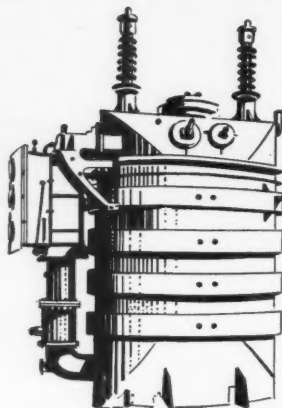
A PRODUCT OF **COMMERCIAL SOLVENTS CORPORATION** 1817 WEST FULLERTON AVENUE, CHICAGO 14, ILL.
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SF₆

*A new concept in
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insulation*



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Sulphur Hexafluoride is a heavy, non-flammable gas and is both chemically and physiologically inert. These characteristics plus its high dielectric strength pin-pointed the heavy duty transformer field as a logical target. And so it turned out!

SF₆ instead of oil is now being used in high voltage transformers with the following advantages:

- operations are much quieter
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- lower maintenance
- fire-proof and explosion-proof

In SF₆, the electrical and electronics industries are finding a very useful product providing both electrical insulation and cooling. As in so many 'headline' products serving industry, the element S is part of the chemical structure!



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high concentrate wettable powders
at low cost with
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SUBSTANTIAL FORMULATION SAVINGS

Micro-Cel®, a new line of synthetic calcium silicates, has extremely high absorptive properties. It is this remarkable capacity for absorption that makes it possible to prepare wettable powders with higher concentrations of dry, viscous or liquid poisons. Micro-Cel's absorption also means that more lower cost diluents can be used. Thus high strength formulation costs are now cut to a new low.

REMAINS FREE-FLOWING—MEETS STORAGE TESTS

With Micro-Cel, these high concentrates will remain in a free-flowing state even after prolonged storage. This is particularly important in producing poisons for the export market.

In addition, suspension values after storage of 1.5

to 2.0 I.C.A. have been achieved in 75% DDT wettable powders, based on Micro-Cel. This is more than adequate for storage conditions encountered in most tropical countries.

DEVELOPED BY JOHNS-MANVILLE RESEARCH

Micro-Cel is another development of Johns-Manville Research. Combining high absorption, large surface area, small particle size and excellent dry flowability, it offers a unique combination of properties for insecticide formulation and other process needs.

Sample quantities and carload shipments are now available. Write for further data and sample formulations for poisons of interest to you. Or ask a Celite engineer to help you adapt Micro-Cel to your particular requirements and specifications.



*Micro-Cel® is Johns-Manville's new absorbent-grinding aid designed specifically for the insecticide formulator.

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MICRO-CEL**

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A PRODUCT OF THE CELITE DIVISION

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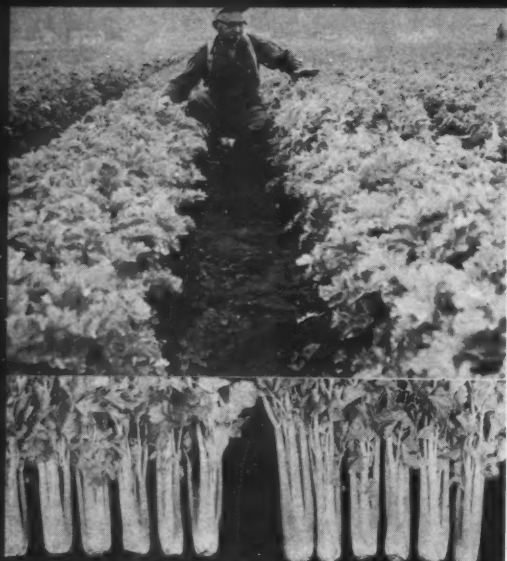
☐ Please have your local representative contact me.

Name _____ Position _____

Company _____

Address _____

City _____ Zone _____ State _____



Effects of gibberellin on the growth of Early Fortune celery 19 days after treatment. Left: control; right (row in background) 100 ppm of gibberellin applied as a foliar spray.



Effects of gibberellin on the growth of sweet corn. Plants in left row sprayed with 100 ppm of gibberellin, control row on right. Photographed 7 days after treatment. Differences in growth were not apparent 10 days later.

Field tests with

GIBBERELLIN

BY S. H. WITTMER AND M. J. BUKOVAC

Department of Horticulture
Michigan State University



ABOVE: Gibberellin promotes earlier and more uniform seed-stalk development and flowering in radish. Left row: plants sprayed with 1,000 ppm; right row, controls. BELOW: Stimulating effects on growth, flowering and fruiting of the tomato. Gibberellin-treated plants (left) were larger and foliage was greener with less damage from early blight.



THE stimulatory effects of gibberellin on stem elongation, growth of dwarf plants, leaf expansion, flowering and fruit setting have been the subject of numerous investigations. It is, however, remarkable that until 1956 little field testing had been done to determine the agricultural value of gibberellin.

Aside from the Imperial Chemicals Industries Ltd. Australian patent application (1955) and other allied and recent work with forage grasses (Leben and Barton, 1957; Morgan and Mees, 1956; Wittmer and Bukovac, 1957), the field thus far has scarcely been touched by the research worker.

Our studies of the effects of foliar sprays of gibberellin on the productivity of field grown crops were initiated in the spring of 1956 and extended in 1957. Summarized here are some of the observed gibberellin responses—favorable or potentially useful as well as deleterious—of selected vegetable crops.

FARM CHEMICALS presents in capsule form a report on field tests with gibberellin on agricultural crops, written by Dr. Wittmer, the author of its first article on the plant growth regulator, and Dr. Bukovac. The authors point out that commercial application of the chemical should proceed cautiously. For some varieties of crops, however, important benefits are now apparent, and its eventual use can be envisaged.

FARM CHEMICALS

GENERAL METHODS

The tests were conducted on the University farms near East Lansing, Mich., and on farms of cooperating growers in Berrien, Kalamazoo, Kent, Lapeer, Macomb, Muskegon, Monroe, Ottawa, Van Buren and Wayne Counties.

All gibberellin treatments were applied as foliar sprays with a 0.1 per cent solution of Tween-20 as a wetting agent. Sprays were applied with a quart size self-contained air pressure sprayer using 75 to 100 pounds pressure. Sufficient solution was applied to thoroughly wet the foliage of the experimental plants. Controls consisted of comparable plants in a paired row. Fifty to 200 feet of row comprised the

usual plot size, although larger areas were used in some of the tests with celery. The control for comparison was either sprayed with water containing only Tween-20 or it more often received no treatment whatever.

The observations tabularized below for specific crops present a summary of those formulated by not only the authors but the cooperating growers, County Agricultural Extension personnel and other co-operators.

CONCLUSIONS

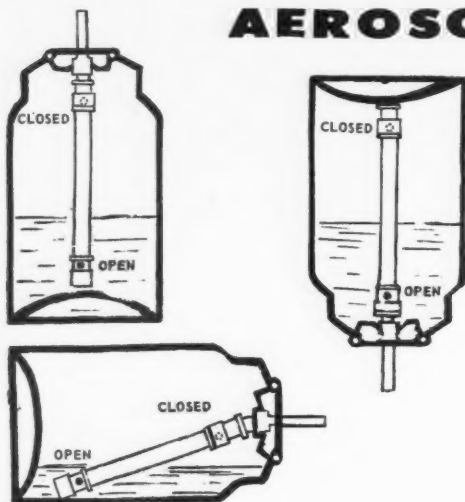
An accurate evaluation for crop production of a chemical producing so many diverse effects on plants as gibberellin cannot be realized (Continued on page 48)

SUMMARY OF OBSERVATIONS OF GIBBERELLIN EFFECTS

Crop and variety	Gibberellin treatment	Favorable or potentially useful effects	Deleterious effects
BUSH SNAP BEANS (Contender, Bountiful)	Foliage spray of 100 p.p.m. When first two (primary) leaves expanded	Flowering and edible pods 2 to 3 days earlier, plant height subject to control	Internodes elongated leaves often wilt and fire, and turn lighter green, vines may require support
CELERY (E. Fortune, Cornell 19, Utah 15, 10-B, 52-70, 52-70H, Gunson 6)	3 to 15 grams per acre as foliar spray 2 to 4 weeks before harvest	20 to 50% increase in yield, maturity 5 to 7 days earlier, greater stalk weight and length, easier to blanch and trim	Plants require more fertilizer and water, more susceptible to blackheart and bolting, time of acceptable harvest reduced, greater pithiness in outer petioles may occur if over-mature
CUCUMBERS (Burpee and Sensation Hybrids, Marketer)	Foliage sprays of 10 to 100 p.p.m. during early growth (1 to 4 or 5 true leaves)	Vegetative growth stimulated, flowering delayed may be useful for mechanical harvesting of pickling types	Delayed fruiting in slicing types
MUSKMELONS (Honey Rock, Harvest Queen)	Same as above for cucumber	Vegetative growth stimulated	Some delay in fruiting and reduction in crown set of fruit
PEAS (Resistant, Progress)	Foliage spray of 10 to 100 p.p.m. when plants 1 to 2 inches high	Flowering and edible maturity 3 to 5 days earlier, plant heights subject to control—may be useful in mechanical harvesting	Dwarf types grow as tall varieties and vines may need support
RADISH (Comet)	Foliage spray of 1000 p.p.m. or 3 to 4 ounces per acre when roots are 1 to 2 centimeters in diameter	Seedstalk formation, flowering, and seed maturity earlier and more uniform	None
RHUBARB—FORCING (Victoria)	Sprays of 10 to 1000 p.p.m. applied to buds and shoots	None	None
RHUBARB—FIELD (Victoria)	Foliage sprays of 100 and 1000 p.p.m. applied to one year old plants	Vegetative growth stimulated, petiole length and thickness increased, broader leaf blades	Leaves lighter green
SWEET CORN (North Star Carmelcross, Seneca Chief, Golden Cross loachief)	Foliage sprays of 10 to 250 p.p.m. during early growth (plant heights 4 to 18 inches)	Frequent male sterility, at higher concentrations, anchor roots larger and more prominent	Smut more prevalent and often induced on leaves and stalks, foliage lighter green, more susceptible to lodging
TOMATOES—FORCING (WR-7, Michigan-Ohio Hybrid)	Flower cluster sprays of 10 to 100 p.p.m.	Promotes greater fruit set, with no modification or injury of foliage	Treated fruit more russeted peduncles and pedicels longer; total yields of marketable fruits may be reduced
TOMATOES—FIELD (Fireball)	Foliage sprays of 100 p.p.m. at time of flowering of first cluster, and repeated after a 10 day interval	Greater vegetative growth, flowering and fruiting; plants continued to grow and fruit, and foliage remained green weeks longer, less injury from early blight, (<i>Alternaria solani</i>)	May result in excessive vegetative growth of indeterminate varieties; greater susceptibility to wilting under hot-day conditions

From an article which appeared in the November issue, Michigan Agricultural Experiment Station Quarterly Bulletin.

ALWAYS-READY AEROSOL



SOME aerosol cans must be held right side up to function. Others must be turned upside down. But now USDA has improved the original designs. Aerosol containers may be used in any position. And the dispenser tube draws the last drop. None of the solution is wasted.

USDA, whose scientists originated aerosol bombs,

has applied for a public patent to make the new design available to manufacturers.

Farmers, housewives and manufacturers can thank ARS chemist R. A. Fulton's observing eyes, which work overtime. He was repairing the washing machine at home one week end, when he noticed a sliding valve controlling the opening and closing of the water outlet. This is the same principle, thought Fulton, as a steam locomotive piston, which goes back and forth, opening and closing the steam valve.

So he made a dispenser tube of stainless steel and drilled a hole at each end. Then he fitted over each end a sliding porthole to open or close the hole in the tube, depending on the position of the can. (A glass bead may also be used inside each end of the tube to open or close the hole.) The tube can be copper, steel or tin-coated steel, depending upon the solution. Polyethylene or nylon may also be used.

Now, no matter in what position the can is held, there will always be a discharge of the product—not the gas. Insecticides will no longer be wasted because of accidental discharge of gas, which makes it impossible to use the rest of the material.

The present aerosol can has a tube with an opening at one end. Space- or surface-coating products are used right side up, with the gas pressure at the top of the container. If the can is turned upside down, the gas escapes when the operator presses down on the valve. The foam-type product is turned upside down to spray, with the gas at the bottom of the can. If operated right side up, gas will escape. ▲

GREATLY increased research on making forests grow faster is predicted through use of a technical book just published by the State University College of Forestry at Syracuse University. It is entitled *Forest Fertilization*.

Dr. Hardy L. Shirley, dean of the College of Forestry made the prediction of increased research. In pointing out the significance of the work, Dr. Shirley declared: "This annotated bibliography is the result of two year's work and has been published to aid the many new investigators on forest soils research, as well as practicing foresters and forest land owners the world over. Forestry educators and researchers also will find the compendium very useful as a reference book."

Dr. Shirley also forecasted that the new bibliography will save a great deal of time and money by reducing repetitive experiments. "For the first time, forestry people will have in one book references to the world's literature on forest fertilization experiments."

Publication of *Forest Fertilization* is the direct result of a special two-year study at the College sponsored by Nitrogen Div., Allied Chemical & Dye Corp. It is the second published work in the College's World Forestry Series.

The 300-page book contains 700 references, with abstracts, on the use of fertilizers on trees throughout the world. It covers the period from 1865 through 1956. Most of the studies have shown a favorable

FOREST FERTILIZATION

response of trees to fertilizers. In addition to including all available studies on forest stands and plantations, the book covers the use of fertilizers in forest nursery management, and shade tree and landscape practice.

The studies range in interest from the efforts of forest poor countries to increase their wood output to the effect of fertilizers in improving the color of ornamental trees.

Copies are available at the cost-of-printing charge of \$3 each from the sponsors of the project. Requests may be addressed to Dr. E. D. Crittenden, director of research, Nitrogen Div., Allied Chemical & Dye Corp., 40 Rector St., New York City 6. ▲

James T. Sheehy, left, exec. vice pres. of Rayonier, Inc., receives first copy of *FOREST FERTILIZATION* from Hugo Riemer, president of Nitrogen Div. Rayonier has underway large-scale tests of fertilizer on their forest lands in co-operation with Allied Chemical.





DELEGATES ATTENDING THE MEETING . . .

. . . NAMED

W. G. Hewitt
1958 CFA President



R. L. Luckhardt
Man-of-the-Year



. . . LISTENED AS PANEL MEMBERS

J. Earl Coke, Dr. G. B. Alcorn, Moderator. D. G. Aldrich, Jr., John Martin, Jr., and L. W. Berry discussed "Our Partnership with Agriculture."



Convention Highlights

When the California Fertilizer Association held its 34th annual convention at the St. Francis Hotel, San Francisco, on November 3, 4 and 5, about 500 people were on hand to witness the proceedings. Here's a picture story showing meeting highlights.

Hon. True D. Morse
Under Secretary of Agriculture



Sidney H. Bierly
CFA General Manager



. . . HEARD TALKS AND REPORTS BY

Jack Baker
1957 CFA President



M. E. McCollum
Chairman, CFA Soil Improvement Committee



Dr. Russell Coleman
Executive Vice President
National Plant Food Institute



Table 1. Consumption of Fertilizers by States and Territories, Year Ended June 30, 1957 (Preliminary)¹

State & Region	Mixtures	Materials ²	Total	Change from 1955-56/ ³
	1,000 tons	1,000 tons	1,000 tons	Percent
Hawaii	260	0	260	0
New Hampshire	15	0	15	0
Vermont	30	17	47	20
Massachusetts	69	15	84	17
Rhode Island	15	0	15	13
Connecticut	51	21	72	10
New England	361	38	399	0
New York	301	0	301	0
New Jersey	255	0	255	0
Pennsylvania	385	41	426	0
Delaware	0	1	1	0
District of Columbia	2	1	3	1
Maryland	669	10	679	0
West Virginia	10	0	10	-3
Middle Atlantic	1,747	52	1,799	0
Virginia	660	130	790	-1
North Carolina	1,141	114	1,255	-14
South Carolina	558	0	558	0
Georgia	1,493	0	1,493	-1
Florida	2,115	0	2,115	10
South Atlantic	5,731	1,051	6,782	-3
Ohio	990	0	990	-2
Indiana	677	119	796	0
Illinois	896	0	896	-1/2
Michigan	576	0	576	1
Wisconsin	422	0	422	0
East North Central	3,497	1,037	4,534	0
Minnesota	395	0	395	13
Iowa	304	130	434	3
Missouri	443	0	443	0
North Dakota	27	0	27	0
South Dakota	9	11	20	0
Nebraska	83	145	228	0
Kansas	76	107	183	-0
West North Central	1,406	260	1,666	0
Wisconsin	600	130	730	1
Minnesota	730	0	730	-0
Illinois	30	0	30	-0
East South Central	1,003	0	1,003	-0
Alabama	150	0	150	-10
Louisiana	177	0	177	-1
Oklahoma	51	0	51	-0
Texas	625	0	625	-0
West South Central	638	0	638	-3
Arkansas	4	0	4	-0
Idaho	7	0	7	0
Wyoming	11	0	11	0
Colorado	11	0	11	0
New Mexico	1	0	1	0
Arizona	0	0	0	0
Utah	3	0	3	-13
Nevada	0	0	0	0
Mountain	26	0	26	12
Montana	27	0	27	7
Oregon	0	0	0	0
California	0	0	0	0
Pacific	308	0	308	0
Southwestern U. S.	10,300	7,707	18,007	0
Small	46	131	177	0
Puerto Rico	0	0	0	0
Territories	226	181	407	0
Total: 1956-57	14,375	6,742	21,117	1
1955-56	13,776	6,742	20,518	0
1954-55	13,340	6,742	20,082	0

¹ Includes fertilizers distributed by Government agencies.
² Includes: ground phosphate rock and colloidal phosphate, basic slag, secondary and trace nutrient materials, as bone, metallic salts, sulfur, gypsum, etc., used as separate materials. Does not include lining materials or the quantity of materials used for manufacture of commercial mixtures.
³ Based on fertilizers which are guaranteed to contain one or more of the primary plant nutrients (N, P₂O₅, K₂O) for direct comparison with percent change in nutrient consumption (Table 1).
⁴ Less than 0.5 percent.
⁵ Includes an estimated 500,000 tons of dried manure.
⁶ Materials included not guaranteed to contain N, P₂O₅, or K₂O totaled 209,000 tons in 1956-57, 709,405 tons in 1955-56, and 731,406 tons in 1954-55.

preliminary report: 1956-57

FERTILIZER

By

Walter Scholl

Florence B. Crammatte

Marion M. Davis

Fertilizer Investigations Research Branch
 Soil and Water Conservation Research Division
 Agricultural Research Service, USDA

FERTILIZERS

THE tonnage of commercial fertilizers consumed in the United States and territories (Hawaii and Puerto Rico) during the year ended June 30, 1957, showed a small gain over that used in the preceding year. The total consumption amounted to 22,485,000 tons, an increase of 292,000 tons or 1.3 per cent (Table 1). Consumption of mixed fertilizers amounted to 14,575,000 tons—a decrease of 201,000 tons (1.4 per cent)—and of materials for direct ap-

Table 3. Principal Classes of Fertilizers Consumed, by Regions, Year Ended June 30, 1957, in 1,000 tons¹ (Preliminary)

Class	New England	Middle Atlantic	South Atlantic	East North Central	West North Central	East South Central	West South Central	Mountain	Pacific	Territories	Total
MIXTURES	361	1,747	4,741	3,297	1,206	1,893	632	56	348	294	14,575
CHEMICAL NITROGEN MATERIALS	12	57	740	307	376	618	412	190	807	144	3,664
Ammonia, anhydrous	---	2	19	35	97	75	106	33	100	1	468
Ammonia, aqueous	---	---	---	2/	2	---	2	16	290	66	375
Ammonium nitrate ^{2/}	7	24	105	124	213	329	141	42	96	---	1,081
Ammonium sulfate	2/	5	6	92	4	7	76	57	208	62	518
Nitrogen solutions	---	3	70	39	52	9	18	2	10	0	204
Sodium nitrate	1	10	273	1	---	149	48	2/	2/	2/	484
Urea	1	3	5	14	7	---	14	21	27	15	107
Other ^{3/}	2	10	260	2	1	50	7	18	77	2/	427
NATURAL ORGANIC MATERIALS	24	40	19	36	8	2	8	11	319	1	465
Dried manures	4	16	3	6	1	1	2	10	251	1	293
Sewage sludge, all	6	14	6	23	2	2/	3	1	60	---	115
Tankage, all	3	9	3	---	---	---	0	---	2	0	17
Other ^{4/}	11	2	6	7	5	1	3	2/	7	0	41
PHOSPHATE MATERIALS	32	91	114	702	527	269	228	142	247	18	2,370
Ammonium phosphates ^{5/}	0	1	1	9	110	1	84	54	125	2	387
Basic slag	0	0	23	0	0	136	3	0	0	0	162
Phosphate rock & colloidal phosphate	2/	7	28	548	211	17	12	0	2	4	829
Superphosphate: 22% and under	30	79	55	68	50	98	79	22	77	7	566
Over 22%	2/	2/	2/	64	140	2	46	---	24	5	282
Other ^{4/}	2	4	5	14	15	15	3	65	20	1	144
POTASH MATERIALS	2	7	85	179	43	71	38	3	12	18	457
Potassium chloride	2	4	39	174	42	53	38	1	6	15	373
Other ^{4/}	1	3	46	4	1	18	1	2	6	2	84
PRIMARY NUTRIENT FERTILIZERS	430	1,943	5,698	4,521	2,160	2,852	1,318	401	1,734	474	21,531
SECONDARY & TRACE NUTRIENT MATERIALS	2/	5	95	1	2	2	3	26	792	3	929
Gypsum	---	---	91	---	2	2/	2/	20	758	0	871
Other ^{4/}	2/	5	4	1	2/	2	3	6	34	3	58
NOT CLASSIFIED	2/	0	1	12	4	1	2	0	4	2/	25
ALL FERTILIZERS	431	1,948	5,794	4,534	2,166	2,855	1,323	427	2,530	477	22,485

¹ Due to rounding, totals of items may not add to column or class totals.
² Less than 500 tons.
³ Minor quantities may have been used for other purposes than fertilizer.
⁴ Includes quantities undesignated by kind.
⁵ Includes all grades: 11-40, 11-50, 13-39, 16-20, 20-52, 21-53, and 27-14 reported either as mixtures or materials.

Grand PLANT NUTRIENT CONSUMPTION in the U.S.

plication 7,910,000 tons—an increase of 493,000 tons (6.6. per cent). Included in the materials are 6,956,000 tons of products containing one or more of the primary plant nutrients (N, P_2O_5 , K_2O), 929,000 tons of secondary and trace nutrient materials, and 25,000 tons not classified. The use of materials containing primary nutrients increased in the amount of 328,000 tons (4.9 per cent) and secondary and trace nutrient materials by 139,000 tons (17.6 per cent) over their respective use in 1955-56.

Although the national consumption of fertilizers showed an increase in 1956-57, compared with 1955-56, there were decreases in 19 of the 51 tabulated areas. Most of the decrease in total fertilizer consumption was accounted for by 9 of the 13 states comprising the South Atlantic, East South Central, and West South Central regions—while the Pacific and West North Central regions accounted for most of the increase. There was little change in the total

tonnage of fertilizer consumed in the East North Central and Middle Atlantic regions—in these—more fertilizer was used in all but 5 of the 12 areas. Most of the states in the New England and Mountain regions, and the territories, showed relatively large proportional increases in total fertilizer consumption.

MIXTURES

The consumption of mixed fertilizers was found to have increased in all but 23 of the tabulated areas. Most of the decrease occurred in states of the South Atlantic, East South Central, East North Central, and West South Central regions—areas in which the principal increases occurred were the territories, and the Pacific and West North Central regions, in this order.

The ten grades consumed in largest tonnage in the Continental United States in 1955-56 were also

Table 4. Consumption of Primary Plant Nutrients, Year Ended June 30, 1957, in 1,000 tons (Preliminary)

Region ^{1/}	Content of mixtures				Content of all fertilizers ^{2/}				Percent change in all nutrients from 1955-56
	Nitrogen	Available P_2O_5	K_2O	Total	Nitrogen	Available P_2O_5 ^{3/}	K_2O	Total	
New England	25	42	43	110	30	49	45	124	5
Middle Atlantic	99	207	197	503	118	225	200	543	4
South Atlantic	208	425	452	1,085	382	442	481	1,305	- 3
East North Central	203	504	504	1,211	316	576	613	1,505	6
West North Central	91	221	170	482	282	348	196	826	11
East South Central	89	214	196	499	300	258	232	790	3
West South Central	49	92	64	205	234	156	87	477	2
Mountain	7	10	2	19	87	60	4	151	11
Pacific	35	38	22	95	307	105	34	446	7
Continental U. S.	806	1,753	1,650	4,209	2,056	2,219	1,892	6,167	4
Territories	35	19	33	87	69	24	43	136	18
Total: 1956-57	841	1,772	1,683	4,296	2,125	2,243	1,935	6,303	4
1955-56	797	1,785	1,655	4,237	1,933	2,247	1,875	6,055	0
1954-55	804	1,821	1,658	4,283	1,960	2,284	1,875	6,119	1

^{1/} The States comprising the regions are listed in Table 1.

^{2/} Content of mixtures and direct application materials.

^{3/} Includes, as available P_2O_5 , 2 percent of the colloidal phosphate and 3 percent of the phosphate rock marketed for direct application.

found to be consumed in largest tonnage in 1956-57 (Table 2). These ten represent 50 per cent of the tonnage of all mixtures consumed in both years. In all regions except the New England, Mountain, and Pacific, their tonnage represents 40 per cent or better of the total tonnage of mixtures consumed in the respective regions. The trend in New England is to use grades having a higher proportion of nitrogen while those in the Mountain and Pacific regions generally contain less potash than shown by the average of these ten grades.

MATERIALS

In all but 15 of the tabulated areas the consumption of materials for direct application was higher than in 1955-56. Areas showing decreases were not necessarily the same as those in which mixtures were also found to have decreased. In 9 states, however, there were decreases in both mixtures and materials—five were in the South Atlantic and West South Central regions.

The use of chemical nitrogen materials compared with 1955-56 increased 392,000 (12 per cent) and potash materials 52,000 tons (13 per cent), while the use of phosphate materials and the natural organic materials decreased 108,000 tons (4 per cent), and 8,000 tons (2 per cent), respectively (Table 3).

Of the liquid types of chemical nitrogen materials, the use of nitrogen solutions showed the highest proportional increase (87 per cent) from 109,000 tons in 1954-55 and 1955-56 to 204,000 tons in 1956-57. Their use more than doubled in most regions except the Middle Atlantic and Pacific regions—in these their use decreased. Aqua ammonia and anhydrous ammonia use increased 21 and 12 per cent, respectively. While the use of aqua ammonia is principally in the Pacific region and the territories, that of anhydrous is in all regions. Consumption was generally 7 to 30 per cent higher in all regions except the East North Central and territories where decreases were noted.

Solid chemical nitrogen products showed greatest consumption changes in ammonium sulfate, urea, and ammonium nitrate—these were increases of 25,

16, and 15 per cent, respectively—while sodium nitrate use decreased 11 per cent.

The principal change in the use of natural organic materials was a decrease of 22,000 tons (16 per cent) in the total consumption of sewage sludges.

The use of the principal kinds of phosphate materials, in general, showed decreases, except for the ammonium phosphates (11-48, 11-50, 13-39, 16-20, 20-52, 21-53, 27-14) which increased from 362,153 tons in 1955-56 to 387,000 tons in 1956-57 (7 per cent). The largest decrease was in the total of phosphate rock and colloidal phosphate—from 930,914 tons to 829,000 tons (11 per cent)—while superphosphates, 22 per cent and under, and superphosphates, over 22 per cent, decreased 7 and 14 per cent, respectively.

The change in consumption of the potash materials was principally the result of a greater use of potassium chloride which increased from 322,411 tons to 373,000 tons (16 per cent).

PRIMARY PLANT NUTRIENTS

The total quantity of primary plant nutrients (N, available P_2O_5 , K_2O) estimated in all fertilizers consumed in the United States and territories was 6,303,000 tons (Table 4). This was 248,000 tons (4.1 per cent) more than in 1955-56. The total for 1956-57 comprised 2,125,000 tons of nitrogen, 2,243,000 tons of available P_2O_5 , and 1,935,000 tons of K_2O . These quantities represent increases of 192,000 tons (9.9 per cent) for nitrogen and 60,000 tons (3.2 per cent) for K_2O and a decrease of 4,000 tons (0.2 per cent) for available P_2O_5 from the respective consumptions in 1955-56. Although the total of fertilizers bearing primary plant nutrients in 1956-57 was but 21,531,000 tons—1,004,000 tons below the peak year of record (1952-53)—the total nutrient content of this lower tonnage of fertilizers contained 657,000 tons more plant nutrients than the larger tonnage in 1952-53.

In contrast to the change in consumption of fertilizers bearing plant nutrients in 1956-57 compared with 1955-56 (Table 1), the total consumption of nutrients increased 2 to 18 per cent in all regions and the territories, except the South Atlantic. The

(Continued on page 57)

Table 2. Regional Consumption of the Ten Principal Grades of Mixed Fertilizers Consumed in Continental U. S., Year Ended June 30, 1957 (Preliminary)

Region	1,000 tons										Total	Percent of Regional Total
	5-10-10	3-12-12	4-12-12	5-20-20	10-10-10	12-12-12	5-10-5	4-16-16	3-9-9	4-10-7		
New England	48	1/	---	---	43	4	4	---	---	---	99	28
Middle Atlantic	642	30	18	1	161	16	173	1	1/	---	1,042	60
South Atlantic	504	80	666	1	51	3	134	1/	510	44	1,993	42
East North Central	109	681	5	562	299	328	12	491	1/	---	2,488	75
West North Central	1	52	1/	199	59	209	5	29	---	---	554	46
East South Central	39	49	193	12	40	12	89	7	1/	320	762	40
West South Central	8	20	1/	13	4	39	170	---	---	---	254	40
Mountain	1/	---	---	1/	2	1	1/	---	---	---	3	6
Pacific	4	---	---	---	26	1/	1/	---	---	---	30	9
Total	1,355	912	882	788	685	612	588	528	511	364	7,225	50

1/ Less than 500 tons.



Second national prize winner was R. W. Papenhausen, Treeland Garden Center, Lindenhurst, L. I., New York

Show and Sell Contest

ONE OF the most successful merchandising ventures of the 1957 season was the \$10,000 Chlordane "Show and Sell" contest, according to Velsicol Chemical Corporation, the contest sponsor. Sales increases among dealer entrants were noted by many formulators and distributors.

Velsicol says results were "phenomenal." There were more than 2,000 entrants and hundreds of qualified finalists. Requests for contest display kits poured in from all parts of the country.

The country was divided into six regions, based on number of store units and area sales volume. Five prizes were awarded in each region, in the amounts of \$500, \$250,

\$125, \$75 and \$50. Regional winners were eligible for the grand national prize of \$1500 seven day trip to Paris for two, and four other national prizes of

\$750, \$500, \$250 and \$125. Additional prizes and bonuses were awarded to distributor and formulator salesmen who helped contest entrants set up displays.

This was truly one contest in which there were no losers, Velsicol reported. Even those who failed to send in photographs and return their entry blanks were money ahead, because concrete results show that wherever a Chlordane display went in, sales went

up. The contest vividly emphasized to dealers the value of good advertising and display material. ▲



First national prize went to Gordon Courtright, East Bay Nursery

Third national prize was awarded to Luke P. Argilla, Argilla and Boscacci, Redwood City, Calif.



PROGRESS IN PEST CONTROL

By M. R. CLARKSON
Deputy Administrator
For Research Service, USDA

THIS nation is continually improving its ability to deal with pests. Research is providing methods and materials, and Federal-State cooperation is sharpening the effectiveness of pest control programs. The various sections of the Entomological Society of America, especially the sub-section on plant pest control and quarantine, are extremely helpful, as are the committees of the national, regional, and state plant boards.

Pest control programs of the Agricultural Research Service are based on the belief that, when practical methods are available, it is better to keep pests out than to have to fight them. When this is not possible, it is better to eradicate damaging pests than to control them. And, when eradication is not practical, it is better to contain the pest than to accept and "live with" it. Oftentimes, this latter policy maintains sufficient control of an outbreak so that results of experience or research may be brought to bear at a later date to effect eradication.

I think it is permissible to say that the State Departments of Agriculture are in complete accord with this philosophy.

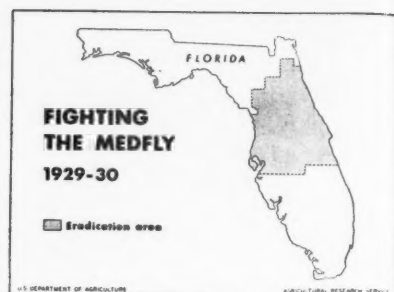
The pest control about which we are reporting is only a small part of the total job of staying ahead of the devastations of insects, diseases, and other pests. Farmers, ranchers, and, in fact, all of us are engaged in a never-ending battle to lessen the economic effects of insects that are eternally taking their unjust share of the fruits of our toil.

Plant Quarantine

The first task of the Agricultural Research Service in pest control is to protect against the introduction of damaging pests from abroad. To do this it is necessary to know them, their geographical distribution in the world, and the ways in which they might come into this country.

At least two measurements, although not precise, are persuasive in suggesting that the port inspectors are doing a good job.

First, in the 45 years since the passage of the Plant Quarantine Act, the number of introductions of harmful foreign insects has been cut more than half—some say more than 65 per cent—from the level of the previous 60 years. It is safe to say we have gained as much with regard to plant diseases. This



has been done in spite of vastly increasing commerce. Total imports and exports in this country have tripled since passage of the Plant Quarantine Act in 1912. More and more people are moving about the world, with increasing numbers by air. A typical scene in the baggage inspection room at Idlewild Airport in New York reveals the heavy traffic.

The second measure may be found in any of the published annual reports on interceptions of plant pests. Last year, some 290,700 lots of prohibited or restricted plants or materials were intercepted at ports of entry. Among them were more than 10,400 lots of insects and some 4,600 lots of diseased materials potentially dangerous to agriculture. Intercepted plant material from one plane at Idlewild Airport in New York makes a sizable load. But one traveler coming to New York a few years ago went to great lengths to bring in some favorite foods. He wore three coats, which yielded, among other prohibited material, mangoes, oranges, peppers, nuts—the hosts to many undesirable pests.

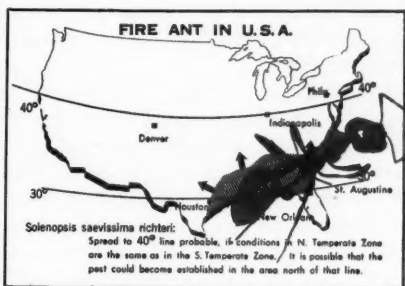
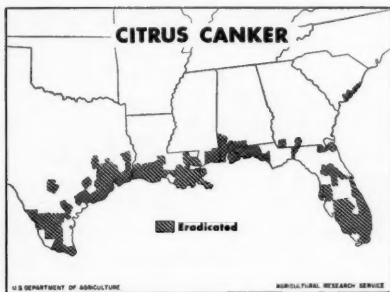
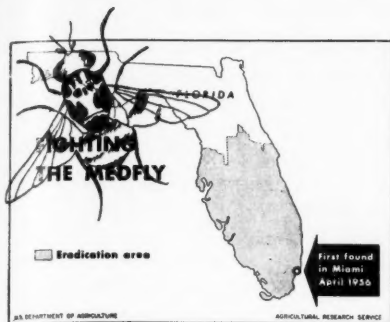
Last year, live Mediterranean fruit fly larvae were identified in 62 separate occasions. The khapra beetle was intercepted on 18 occasions, citrus canker 60 times, melon, oriental, West Indian, and olive fruit flies 30 times, pink bollworm 42 times, and golden nematode 83 times. There were many, many others.

However, no record is made of the thousands of interceptions of insects or diseases which are not economically important. When such interceptions do become a part of the record it is because of some newly significant fact—a new country of origin, new host, or because its present existence in the United States is so limited that it is worthy of mention.

Quarantine work is publicized more often for its failures than for its successes, unfortunately. Think how often you have wondered how a pest was allowed to get through the quarantine. Contrast that with the number of times you have congratulated the service on continuing to keep pests out.

The Mediterranean fruit fly is a well-known example of a pest that slipped past the guard twice. It was quickly wiped out after the outbreak in 1929 in Florida, and for 27 years it was kept out. Although it came again in 1956, it is almost gone now. The parlatoria date scale, eradicated in the early 1930's has been kept out ever since. Many pests around the world have been stopped at our borders.

When a dangerous pest does get through the guard and sets up house-keeping in some area of this coun-



try, it is necessary to mobilize all resources to prevent loss.

The backbone of this mobilization is a planned system of observation, survey, detection, and prompt reporting. Locating the pest and giving accurate information as to its significance is of first importance in taking countermeasures against it.

During the past six years we have worked with the various agencies of the states in a systematic survey on insects and plant diseases. Some routine parts of these surveys deal with regularly recurring outbreaks and spread of domestic insects and diseases. One of the principal purposes is to maintain a constant alertness to infestations from abroad. Most of the work is done by the state agencies. This work is fundamental to the success of any action program, whether the decision is to eradicate or to control.

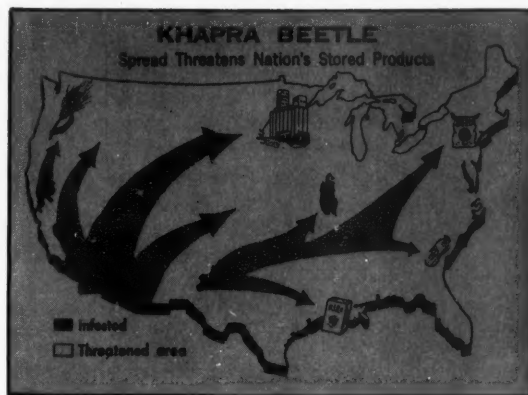
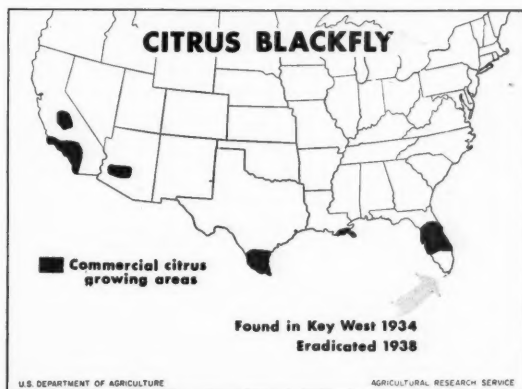
The Agricultural Research Service coordinates the findings and, in addition, whenever necessary, verifies identifications of rare insects and diseases.

Only a few pests are subject to organized regulatory activities. They are generally those introduced from abroad which have occupied only a portion of their potential range in this country; or, they are those which have become established in one area and threaten to spread to another. There are exceptions, of course, such as the grasshoppers on rangelands and the barberry which is suppressed to protect against cereal rusts.

Eradication Is Often Practical

It is often said that eradication is impractical and that people should not be led to believe that they may hope for complete freedom from a pest. All outbreaks present difficult problems from the standpoint of eradication. Most cases require many years of hard work and considerable expense. Each must be weighed on its merits. The record will show that when a professional staff is given the necessary resources and support, eradication is often a practical goal.

Citrus canker, a bacterial disease, invaded the southern States and gained a substantial foothold before it was wiped out in the early 1940's. Eradication measures were drastic, involving the burning of infected and exposed trees. The citrus blackfly, discovered in Florida in 1934, was gone in four years. Before they were stamped out, both of these threatened areas far beyond their original limits. In each case, the struggle was difficult and marked by discouraging recurrences many months after success



seemed assured. This is the certain last stage of any eradication program, and must be expected and prepared for.

Take the recent outbreak of the Mediterranean fruit fly. First discovered at Miami in April of 1956, it quickly spread—helped by travelers until finally it was found in 28 counties in Florida. You know what this fruit fly does. Can you imagine our people tolerating the larvae of this or any other fly in their morning orange or grapefruit?

We are now in the mopping up stage of eradication—that discouraging period when one, two, or three months elapse without any evidence of the fly. Then one or two are caught. As of now, the last report shows two specimens were found on November 26—the first in 20 days.

Each time a reluctant fly is found, the complete treatment is applied to the area. Altogether, during the 19 months since its discovery, more than 800,000 acres have been treated intensively. There may be further recurrences, but each will be dealt with promptly, until the fly is gone.

New techniques and new scientific knowledge, including the development of an attractant immediately before the fly was discovered in Florida, made possible the rapid approach to eradication of the Medfly. We can thank our close correlation of research and regulatory development programs for this. Although the communities affected were well aware of the spray program, serious dislocations in the industry and drastic measures such as those used in 1929 were not necessary in this campaign. With an expenditure of around \$10 million, it was possible to protect two of Florida's major industries—fruits and vegetables—with an annual production worth around \$400 million. Also, eradication of the Medfly while still within the bounds of one state was insurance for the growers of soft fruits throughout the Southeast and in all the southern areas of the nation. The Federal-State program had the complete cooperation of the industry and the people of Florida.

Khapra Beetle Discovered in 1953

Many consider the khapra beetle the worst pest of stored products. It could not be tolerated in our channels of trade. This intruder from abroad became established in small areas of California, Arizona, New Mexico and in a small area near the border in Mexico. It was discovered in 1953. When the khapra beetle struck, the scientific know-how of the whole world had to be sifted to find countermeasures. It not only took new scientific knowledge, but also new developments such as the use of enormous air-tight plastic tarpaulins to make possible large-scale fumigation. New methods were tried in field operations and adjusted to meet local needs. We believe the khapra beetle is on the run, but surveys are being intensified to prevent any setbacks.

Hall scale is a familiar name, but I daresay most of you have not seen much of it. With the exception of a few properties in California, it has not been known in this country. Brought in with foreign plant introductions, it was found in 1934. It could cause severe

damage if it should spread throughout the stone fruit areas. Results of current work give us confidence that this insect will soon be gone.

The imported fire ant is much in the news these days, although it has been known in this country since before 1930. It damages a number of crops, its mounds are hazardous to machinery in fields, and it is an irritating trespasser on animals, birds and man. Even a few deaths have been attributed to this ant. Within the past five years the imported fire ant population has increased greatly in intensity and spread. It is now found in nine southeastern States. We do not have surveys accurate enough to delineate the infested areas precisely within each state.

Appropriation for Fire Ant Eradication

The past session of Congress appropriated \$2.4 million to the Department to cooperate with the states in a program aimed at the prevention of spread, control, and eventual eradication of the fire ant. Thus far, the individual states have provided well over \$1 million. As the program moves along it is apparent that State and local governments and property owners will have provided substantial additional resources. Eradication in any given area is necessarily a slow process extending over years, including the inevitable "mopping-up" procedures.

The first step in this program was to take measures to prevent further spread of the ant. Unrestricted, it could spread over half of the country where conditions are comparable to its native South America. Federal quarantines are under consideration, with matching state quarantines for intra-state protection. Federal and State officers are making more systematic surveys, and planning eradication of outlying infestations.

Another long-range eradication effort is being directed against the gypsy moth. The Northeast has endured the gypsy moth for 90 years. During this time it has been held in check by Federal, State and local activity. Because of lack of adequate resources, there have been periods of considerable extension of the areas of infestation.

The heaviest infestation occurs in New England, eastern New York, and northeastern Pennsylvania. The stepped-up program, initiated in 1956, has covered about four million acres in New York, Pennsylvania and New Jersey, in the past two years. This area is being protected from reinfestation by regulating the movement of plants and other products into the treated area. Planning is now under way with the authorities of the several states involved to make further progress next year.

You may know that an injunction proceeding has been brought against officials of USDA and the New York State Department of Agriculture. It is designed to restrain the treatment of certain areas in New York for gypsy moth eradication. It is expected that the case may come to hearing next month. The two departments have developed a strong case in support of their position.

Funds were provided by Congress during the last session for cooperation with the southeastern states

in eradication of the screwworm fly. You know of the imaginative research job that found the way to eliminate screwworms from an area through the repeated releases of sterilized flies. Facilities are being established for the more than 50 million flies that will have to be reared, sterilized by irradiation, and distributed *each week* when the program gets under way. Research and new field trials indicate that persistent distribution of these flies will bring the screwworm population down low enough that natural predators will finally help eliminate it. This is another good illustration of the interdependence of research and control programs and the close cooperation of Agricultural Research Service and the States.

We estimate that it will take a minimum of two years to do the job in the Southeast. Meanwhile, and continuing after the eradication effort, measures will have to be taken to prevent the reintroduction of screwworms from the southwestern areas of the country. With the cooperation of the states an effective livestock inspection program is being devised for this purpose.

Other pests have come from abroad to gain a foothold despite quarantine and control measures. In some of these cases, such as the golden nematode, soybean cyst nematode, witchweed, and European chafer, slow but gradual progress is being made. For example, the white-fringed beetle has been stamped out in New Jersey, although the struggle is nip'n tuck in infestation in the South. In the case of two very important pests, however, the insect continues to gain some ground each year.

The Japanese beetle attacks some 200 agricultural and ornamental plants, causing estimated damage of many millions of dollars annually. Regulatory measures are in force in all or parts of 15 states under quarantine. Local infestations ranging from scant to heavy exist in seven other states.

Each year, with persistent effort, some outlying spots are eliminated, but we have not quite kept up with the travels of the beetle. In addition, the southern and western periphery of the generally infested area continues to expand slowly. To some this means that the program has failed and that the areas should be released from quarantine. I think you will agree, however, that the delay caused by quarantine and suppression activities is worth many times the annual expenditure especially to the uninfested areas.

A similar situation exists with regard to the pink bollworm. It occurs in Texas, New Mexico, and Oklahoma, and in parts of Arizona, Arkansas and Louisiana. However, all cotton producing areas are threatened. Quarantine and suppressive measures, plus the stamping out of outlying infestations, have delayed the pink bollworm. But we have not yet found the way to stop the creeping progress of this pest. It is heartbreaking to those situated in its path to feel that it is just a question of time until they, too, will be saddled with the special practices necessary to reduce yearly losses. Great acclaim will come to the person who works out a method to get rid of this pest.

In recent years pest control and eradication work has been greatly advanced by new techniques and

new knowledge obtained from research, and from experience throughout the world.

Interest continues to grow in the use of biological methods for control of insects and diseases, although the idea of biological control is not new. The search goes on constantly the world over for parasites, diseases, and predators that will attack the harmful pest and at the same time not be a source of additional damage.

Over the years, 11 different parasites and predators against the gypsy moth have been imported for biological control. Five have been established which attack the Japanese beetle. These have helped a great deal but, as anyone can see, they have not solved the problem.

The Agricultural Research Service and the state experiment stations have worked together to develop biological controls. Effective work has been done, and our hopes are for still better methods. One danger is the tendency to expect more from such controls than scientific facts would support. All factors must be weighed carefully in determining the best method of attacking a pest, and whether the aim is control or eradication.

Control of Pests

For the time being, chemicals provide the major method of controlling plant and animal pests. We must bear in mind that the "ammunition" we are using has to be handled carefully and used within certain limits prescribed for safety. In the development and use of control and eradication measures, we give constant attention to the protection of human health as well as livestock, fish and wildlife.

State and Federal regulatory workers need the benefits of research and experience throughout the world. They must be prepared to deal with exotic pests which may at any time demand special knowledge, sound judgment, and instant action. None of these groups can accomplish its tasks alone.

However, progress creates problems. One of the big problems associated with today's eradication and control programs is that of establishing and maintaining good public relations. The public is frequently faced with the less-pleasant aspects of a successful program—property treatment with insecticides, baggage inspection, road blocks, and the like. The effectiveness and efficiency of controls often depend upon the public's informed acceptance of such programs.

The historian Toynbee has predicted that in a few hundred years this century will be remembered not for its spectacular achievements like the splitting of the atom. He says it will be recognized as the first age in which people dared to think it practicable to make the benefits of civilization available to the whole human race. Certainly the twentieth century marks the first time, since the locusts plagued the Egyptians, that man has dared to think it practical to wipe out major pests. We shall continue to think it practical, and continue to act—to progress—in the years ahead. ▲

Presented before the Entomological Society of America, at Memphis, Tenn., Dec. 4, 1957.

GIBBERELLIN

(Continued from page 37)

in only one, and in some instances, two years of field experimentation. Commercial application of foliar sprays of gibberellin to vegetable crops will need to proceed cautiously since favorable effects must be carefully weighed against deleterious ones. In celery production, seed production in radish and perhaps other long day annuals, and for early fruiting and increased vigor of determinate tomato varieties such as Fireball, important benefits are now apparent and its eventual use can be envisaged. With beans, cucumbers, muskmelons, peas, rhubarb and sweet corn the potentially useful effects may not be realized without some control of accompanying unfavorable responses. ▲

The authors acknowledge the financial assistance of Chas. Pfizer Co. and Merck and Co. in these studies. The gibberellin used consisted of potassium gibberellate from Merck and Co.; a mixture of gibberellins A₁ and A₂ from Chas. Pfizer Co.; and Gibberellic acid (gibberellin A₃) from Eli Lilly Co. No differences in biological responses—qualitative or quantitative—have been observed in the above gibberellin preparations.

The authors gratefully acknowledge the assistance of the many growers who cooperated in these studies, the Agricultural Extension Agents and their staffs in each of the counties, the Ferry Morse Seed Co. and Dr. Frank E. Visscher, Health Specialties, Inc.

NAC REVIEWS 1957 MARKET DEVELOPMENTS

FARMERS used about the same volume of pesticide chemicals in 1957 as in 1956, while volumes of these chemicals used by home gardeners and others increased slightly during the year, reports the National Agricultural Chemicals Association.

Total sales of basic pesticide chemicals are estimated at \$250 million for 1957. This is equal to the record high sales attained in 1956. About 60 per cent of the industry's sales are to farmers, 20 per cent to non-farmers users (including home gardeners) and 20 per cent are in exports.

Five major market developments for the industry during the year were:

1. Growing interest of foresters in using chemicals in forest conservation. Forest insects and diseases are now killing nine times as much timber as forest fire, causing a critical problem both for the \$20 billion forest products industry and for forest conservationists.

2. Wider use of chemical insect, plant disease and weed control in home gardening and lawn care, bolstered by expanding suburbs and increased leisure time for gardening.

3. A steady growth in exports, particularly to underdeveloped areas of Asia and Africa where improved pest control is the key to increasing food production and to improving public health through control of disease-carrying mosquitoes, fleas and rats.

4. Growing importance of aerial application of pesticide chemicals in agriculture and in forest maintenance. More than 7,500 airplanes flew an estimated

1,000,000 hours in aerial application in 1957 compared with 700,000 hours flown for this purpose in 1951.

5. Small but steady increases in the relatively new uses of pesticide chemicals to (a) protect elm trees against damage from Dutch elm disease, (b) control brush, weeds and noxious plants along highway roadsides and (c) protection of park visitors through control of tormenting insects and injurious plants such as poison ivy in public parks. ▲

WEED SOCIETY MEETS IN MEMPHIS

"FUNDAMENTAL Research in Weed Control" will be the theme of the general session at the second meeting of the Weed Society of America, according to Dr. W. B. Ennis, Jr., society president. The group will meet January 13-15 at the Hotel Peabody, Memphis, Tenn.

Host to the meeting will be the Southern Weed Conference whose annual meeting will be held January 16.

Leading authorities from three nations will discuss various phases of weed control at the opening sessions of the society meeting Monday morning, Jan. 13.

Following the presidential address by Dr. Ennis, who is acting chief of the Crops Protection Research Branch, Crops Research Div., ARS, USDA, will be a discussion of "The Role of Basic Research in Weed Control" by Dr. W. E. Loomis, of Iowa State College's Department of Botany. Dr. H. L. Haller, assistant to the administrator, ARS, USDA, will speak on "The Impact of the Miller Bill on Research and Development of Herbicides and Recommendations for Their Use in Crops."

A report on "The Role of Industrial Research and Development in Weed Control in Europe" will be presented by Dr. E. Holmes, Plant Protection, Ltd., Surrey, England. He will be followed by Dr. Ewert Aberg, Royal Agricultural College, Uppsala, Sweden, who will discuss "Problems, Progress and Organization of Weed Control in Continental Europe."

Dr. Kenneth McFarland, a guest lecturer for General Motors Corp., will be the guest speaker at a banquet on January 14.

Sectional meetings are planned for the second and third days of the meeting. Subjects include the control of weeds in agronomic and horticultural crops, the control of weeds and woody plants in pastures, range lands, forests, rights of way and other areas, control of weeds in turf, and weed control teaching and extension.

The Weed Society of America, founded in December of 1954, was formed "to encourage and promote the development of knowledge concerning weeds and their control through publishing research findings, fostering high standards of education, encouraging effective regulation and promoting unity in all phases of weed work. All interested persons have been invited to attend WSA meetings." ▲

FARM CHEMICALS

Equipment & Supplies

NEW SPRAY NOZZLE TIP



A new spray nozzle tip for use with its GunJet No. 2 or No. 42 Spray Guns has been developed by Spraying Systems Co. Named the DDOC Tip, it will project a spray in a flat spray pattern up to 42 feet wide.

Rigidly mounted on the rear of a tractor about three feet above the ground level and pointing to the rear, the gun will do an effective job of broadcast spraying of grains and grasses and related types of operations, Spraying Systems reports. The new tip is made with four orifices to provide equalized distribution of the spray throughout the pattern area. For more information,

CIRCLE 25 ON SERVICE CARD

NEW LIFT TRUCK

Towmotor Corp.'s new lift truck, which has a load-carrying capacity of 4000-pounds at 24-inch load center, is available in gasoline, LP-Gas, or diesel models, all of which bear Underwriters Laboratories and Factory Mutual Approvals. While compact in size, the truck has the power necessary to handle bulky loads weighing up to two tons.

The truck's small size, light

weight and maneuverability in close quarters permits easy entry into carriers for fast loading and unloading. Its standard mast permits stacking in trailers, boxcars and other low headroom areas. Its hydraulic system lifts a 4000-pound load 8 feet in less than 15 seconds. For details,

CIRCLE 26 ON SERVICE CARD

NEW TYPE PAPER BAG FEATURES INSERT

The Multiwall Bag Div. of the Owens-Illinois Glass Co. in cooperation with Wyandotte Chemicals Corp., has developed a new type multiwall paper bag which



The company's new bag makes for compact pallet loads, permits high stacking.

promises to be very useful in the palletization, handling, and warehousing of industrial chemicals and other dry products.

The bag features a pasted valve reducing insert which permits standardization of pallet patterns regardless of the density of the packaged product. The insert makes possible a bag of standard length and width, but with a thickness when filled that may range anywhere from 3½ inches to 6½ inches. This means that the capacity of the bag is varied to suit the properties of whatever is put into it, without altering the two dimensions that govern pallet patterns. The insert is designed

and applied so that a tight, self-sealing factor is added, insuring against costly spillage. The customer may specify whatever size insert he may need to fit his packing machinery filling spouts.

The bag is three-ply, using 40 basis weight sheets and one 50 basis weight sheet of natural Kraft paper. It lends itself more readily to high stacking, thus making more economical use of space in boxcars, trucks and warehouses.

PORTABLE BAGGING SCALE HAS EYE-LEVEL COUNTER

Richardson Scale Co.'s high-speed bagging scale (Model E-50) is now available in floor portable style. Mounted on a heavy-duty frame set on casters, the new unit is easily moved to serve many bins on the floor. The scale features the inclusion of an eye-level counter for tallying the number of bags filled. This feature enables the operator to maintain an on-the-spot record of all bagging operations.

Fitted with a quickly-detachable and changeable bag spout to accommodate 25-lb., 50-lb., or 100-lb. bags, the scale weighs and fills open-mouth paper or textile bags with fertilizer, feeds, grain, rock products, chemicals, food products and a variety of similar materials. For further data,

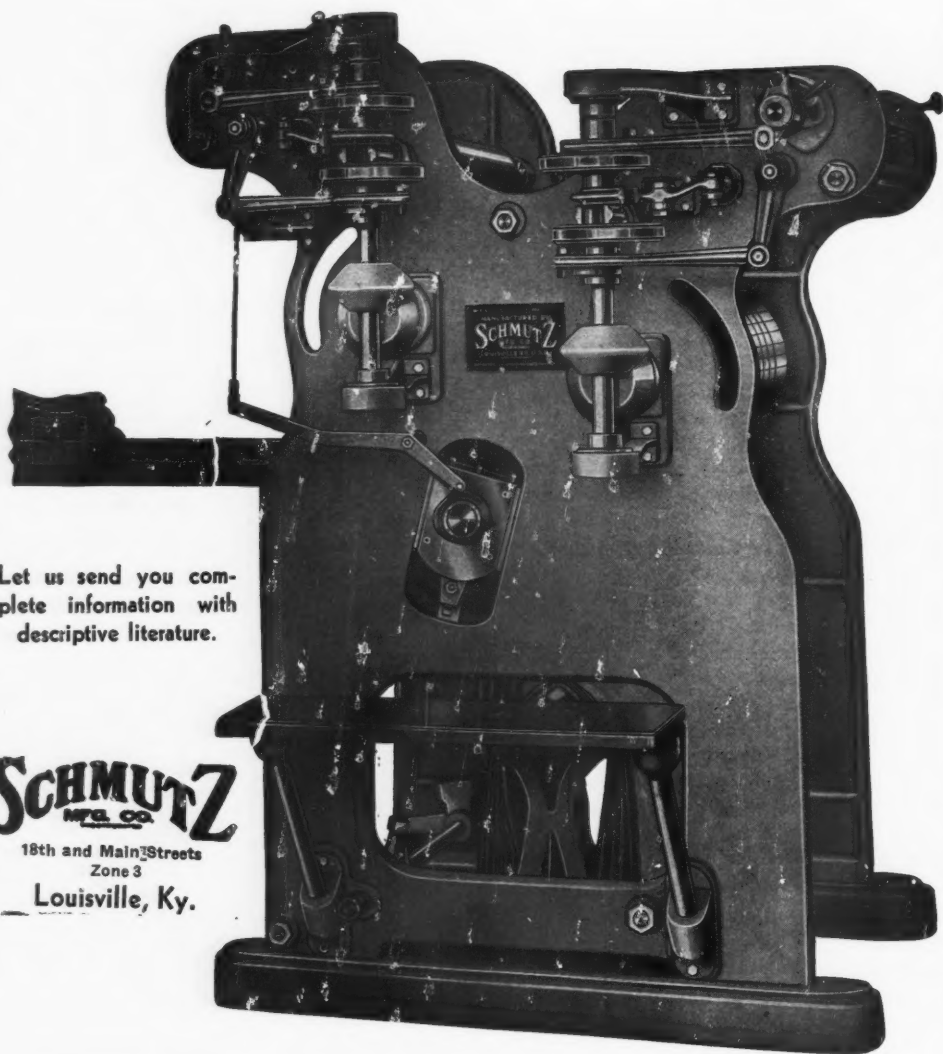
CIRCLE 27 ON SERVICE CARD

Richardson's high-speed bagging scale now available in portable floor style.



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NEW PROCESSING PLANT FEATURES AUTOMATION

A complete analysis liquid mixed fertilizer plant featuring automatic operation has been introduced by Barnard & Leas Manufacturing Co., Inc.

The "Complete Autobatch Skid Plant" consists of a "B & L Auto-



The B & L Complete Autobatch Skid Plant

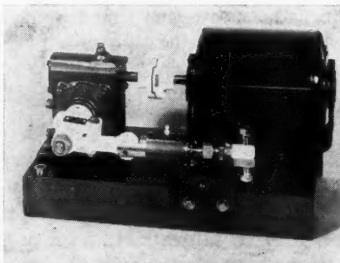
batch" control unit for producing neutral solutions, a scale-mounted "B & L Liquefizer" for adding solids, automatic solids handling system with cycle control, central routing panel, completely wired and prepiped internally, all mounted on a heavy duty welded

I-beam skid frame.

The unit is designed as a complete package for ready installation by connecting to raw material supply, and electrical connection. A minimum of auxiliary equipment is required for the overall operation. A wide range of complete analysis liquid mixed fertilizers can be produced.

MILTON ROY CO. DEVELOPS NEW METERING PUMP

Milton Roy Co. has introduced a new model to its miniPump line of controlled volume pumps for flow rates to 7880 milliliters per hour and pressures to 1000 pumps per square inch. Constructed with motor drive action on the plunger for suction as well as discharge strokes, this pump



has a repetitive accuracy of one per cent of full capacity.

Available with column valve type liquid ends constructed of plastic, Milroy stainless steel or Hastelloy C, the industrial mini-

FOR SALE: Beaird Rotary Dryers 4 x 30; Rotary Steam Tube Dryers 4' x 30, 6 x 45. Dewatering Presses: Louisville 8-roll 36", Davenport #2A, 1A, Mikro Pulverizer #2DH. Ribbon mixer: 336 cu. ft. Steel Tanks: 400 gal. to 9500 gal. SEND US YOUR INQUIRIES. PERRY, 1430 N. 6th St., Phila. 22, Pa.

Pumps are ideal for accurately metering minute quantities of costly or corrosive fluids.

NEW CLIMATE-LAB AID TO INDUSTRY

A testing instrument that can duplicate and accurately sustain almost any global climatic condition has been made by the American Instrument Co., Inc. Called the Climate-Lab, it can recreate any climatic condition up to 99 per cent relative humidity, and up to 160 degrees Fahrenheit.

The Climate-Lab assists science in knowing more about seed germination, insect control, and hundreds of other diversified subjects. Food containers can be tested under all kinds of weather conditions for knowledge of food spoilage, and electronic, automotive and aeronautical equipment can be tested for workability under severe weathering conditions.

The Climate-Lab has a 9.6 cubic foot capacity test chamber which is highly insulated. The entire test chamber is made of Allegheny Ludlum Steel Corp's type 304 stainless steel.



Rose Smith of the American Instrument Co., Inc., is shown placing electronic equipment into the Climate-Lab which simulates various climatic conditions.

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by Dr. Melvin Nord

PATENT REVIEWS

FERTILIZERS

U. S. 2,803,531, issued Aug. 20, 1957 to Gunder G. U. W. Swenson and Just R. L. Swenson, assigned to Norsk Hydro-Elektisk Kvaelfabrik, relates to a method of treating raw phosphate for the production of monoammonium phosphate and of a nitrogen-phosphorus-containing fertilizer.

Raw phosphate is first dissolved in nitric acid. The resulting solution is then divided into two parts.

One part is cooled, crystallizing out calcium nitrate. The remaining solution is then neutralized with gaseous ammonia, precipitating fluorine and the remaining lime as fluoride and phosphate, which are separated off. Ammonium phosphate is then crystallized out by cooling the remaining solution.

The other part of the original solution, together with the mother liquor from the crystallization of ammonium phosphate, is processed to produce nitrogen-phosphorus containing fertilizer.

U. S. 2,804,370, issued Aug. 27, 1957 to William B. Dancy and William N. Stanley, assigned to International Minerals & Chemical Corp., describes a process for the production from langbeinite ore of a low grade potassium sulfate which is a suitable fertilizer constituent.

U. S. 2,804,371, issued Aug. 27, 1957 to William B. Dancy and Albert Adams, assigned to International Minerals & Chemical Corp., describes a method for the recovery of potassium chloride from a brine containing potassium and sodium chlorides and sulfate compounds.

U. S. 2,804,383, issued Aug. 27, 1957 to Robert D. Pike, describes a method of making a complete concentrated mixed fertilizer, hav-

ing over twice the concentration of plant food units generally marketed while retaining the same proportions between nitrogen, phosphorus, and potassium.

U. S. 2,805,138 issued Sept. 3, 1957 to Jacob Poldervaart et al, describes a process for the preparation of artificial fertilizer from waste fuller's earth, resulting from oil-refining operations. When such oil-bearing fuller's earth is burned, a residue is obtained which is excellently suited as artificial fertilizer. It is a very fine powder, which can easily be spread, and under certain circumstances can be sprayed.

U. S. 2,805,768-70, issued Sept. 10, 1957 to James E. Lawver and assigned to International Minerals & Chemicals Corp., relate to methods of beneficiating potash minerals and phosphate ores by a dry electrostatic separation process. Instead of using the phenomenon of conductance, these patents employ the phenomenon of contact potential. The particles of ore to be separated are subjected to an electrostatic field while they are in a freely falling condition. The differentially charged particles are caused to be differentially displaced during their travel through the electrostatic field, in order that a suitable split may be accomplished in the lower part of the apparatus.

U. S. 2,806,003, issued Sept. 10, 1957 to Jean R. Housset and Marcel C. V. Jean, assigned to Societe Chimique de la Grande Paroisse Azote et Produits Chimiques, relates to the catalytic conversion of higher hydrocarbons into methane, for use in the production of synthetic ammonia.

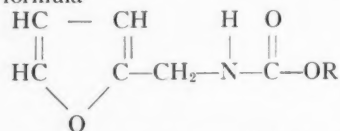
U. S. 2,807,521, issued Sept. 24, 1957 to Wendell B. Lambe,

Alfred R. Smith, and Herbert Otani, and assigned to Chemical Construction Corp., relates to the production of phosphoric acid by the digestion of phosphate rock with sulfuric acid.

The object of the patent is to produce large, easily filtered crystals of calcium sulfate dihydrate, by the use of dilute acid and low temperature in the digestion step. This is accomplished by taking advantage of the increase in water vapor pressure that occurs when concentrated sulfuric acid is diluted with hot weak phosphoric acid from the washing of the filter. By applying a vacuum to this mixture, the heat of dilution of the sulfuric acid is removed by evaporation and the temperature reduced to desirable digester conditions. Effective heat removal is thus obtained without the scaling of any heat transfer surfaces.

GROWTH REGULANTS AND HERBICIDES

U. S. 2,804,381, issued Aug. 27, 1957 to John A. Garman and Donald K. George, assigned to Food Machinery and Chemical Corp., discloses the herbicidal action of alkyl esters of 2-furfuryl carbamic acid, having the generic formula



where R is an alkyl radical containing up to 6 carbon atoms.

U. S. 2,805,926, issued Sept. 10, 1957 to Dwight L. Schoene and John W. Zukel, assigned to United States Rubber Co., relates to chemicals which are useful for inhibiting the sprouting of potatoes, the sucker development of tobacco, and slowing down grass growth to reduce frequency of mowing.

The chemicals are the hydroxymethyl and aminomethyl derivatives of maleic hydrazide and their salts.

The patent describes methods

FARM CHEMICALS

... PATENTS

of preparing these compounds, and tests of the results in use.

U. S. 2,805,927, issued Sept. 10, 1957 to Philip C. Hamm, assigned to Monsanto Chemical Co., discloses the use in selective contact herbicidal compositions of thioacetamide.

According to the inventor, such a herbicide is exceedingly useful for killing crab grass in blue grass lawns, for not only does it not kill the blue grass, but it actually stimulates its growth. It can also be used to destroy apical dominance by killing the terminal bud of certain plants and permitting the growth of auxiliary or secondary buds.

U. S. 2,807,530, issued Sept. 24, 1957 to Keith C. Barrons and assigned to The Dow Chemical Co., discloses the use of 2, 2, 3-

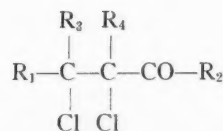
trichloropropionic acid or its salts as herbicides.

PESTICIDES

U. S. 2,792,327, issued May 14, 1957 to Madison Hunt and assigned to E. I. du Pont de Nemours & Co., discloses a method of employing sodium monomethyl dithiocarbamate for the prevention and control of fungus infestation of living vegetation.

U. S. 2,794,727, issued June 4, 1957 to Keith C. Barrons, assigned to The Dow Chemical Co., discloses the use of propargyl bromide for controlling fungi, wireworms, sugar beet nematodes, and root-knot nematodes.

U. S. 2,805,184, issued Sept. 3, 1957 to Samuel F. Clark relates to a new class of compounds which are toxic to fungi and insects, namely chalcone dichloride and its derivatives,—



where R_1 and R_2 are aromatic rings or chlorinated aromatic rings, and R_3 and R_4 are alkyl or hydrogen.

ADDITION OF TRACE ELEMENTS TO SOIL

U. S. 2,806,773, issued Sept. 17, 1957 to Gordon R. Pole, assigned to Minnesota Mining & Manufacturing Co., provides a method of applying trace elements to soil, in which the finely divided trace elements are applied in the form of coatings on relatively massive, inert carrier components.

The inert material may consist of greystone granules, crushed brick granules, quartz granules, ground corncobs, etc. The binder may for example be a sodium silicate solution, resinous materials, etc.

FEEDING AND FERTILIZER MATERIALS

(SINCE 1898)

SAMUEL D. KEIM

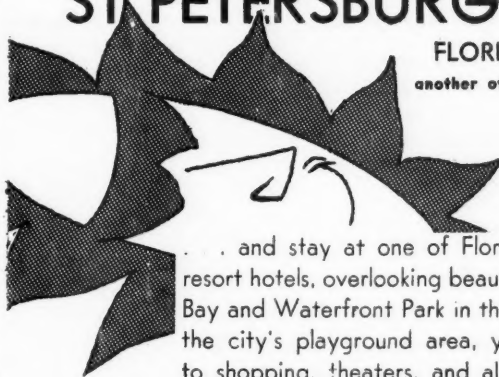
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PEST REPORTS

IMPORTED FIRE ANT ERADICATION PROGRAM

A PROGRAM with its ultimate aim of eradication of the imported fire ant (*Solenopsis saevissima richteri*) is now under way in the southeastern part of the United States. The insect was first identified in this country in 1930 from specimens collected in the vicinity of Mobile, Ala. Indications are, however, that the pest may have been established in the United States earlier than 1920.

The imported fire ant, a native of South America, closely resembles the native southern fire ant in appearance and its mound-building characteristics. The imported fire ant is both destructive and annoying. It stings man and animals and in feeding injures a wide variety of crops. The sting is painful and may fester and persist for several days. It is difficult to hire or retain laborers to harvest crops in infested fields. Reports have been received, that the born birds and animals. The huge

ants may also injure, and kill new-mounds are unsightly and interfere with agricultural operations, often damaging harvesting equipment.

The ant is known to be in 171 counties of the 9 southern states of Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina and Texas (See Map). The infested area comprises about 25,000,000 acres. The heaviest areas of infestation are in Alabama with 40 known infested counties; Louisiana, 32; Georgia, 26; Florida, 12; and Mississippi, 41. The number of mounds vary from widely scattered along roadsides and right-of-ways to over 100 mounds per acre in some fields and pastures of the more heavily infested States.

The present undertakings have been made possible by the Second Supplemental Appropriation Act of 1958 which provided \$2,400,000 to the USDA to begin, in cooperation with the states, counties,

Presented in cooperation with the Economic Insect Survey Section, Plant Pest Control Branch, Agricultural Research Service, USDA.

municipalities and property owners, a fire ant eradication program. Several of the affected States have appropriated an aggregate amount of approximately \$1,000,000 to combat the pest. The objectives of the cooperative program are to prevent further spread of the pest, to locate all existing infestations and to progressively eradicate the pest.

At the present time dieldrin and heptachlor are generally accepted as the most effective materials for use in the eradication program. Effective results have been obtained by the broadcast application of these materials as a 10 per cent granular mix applied at the rate of 20 pounds per acre.

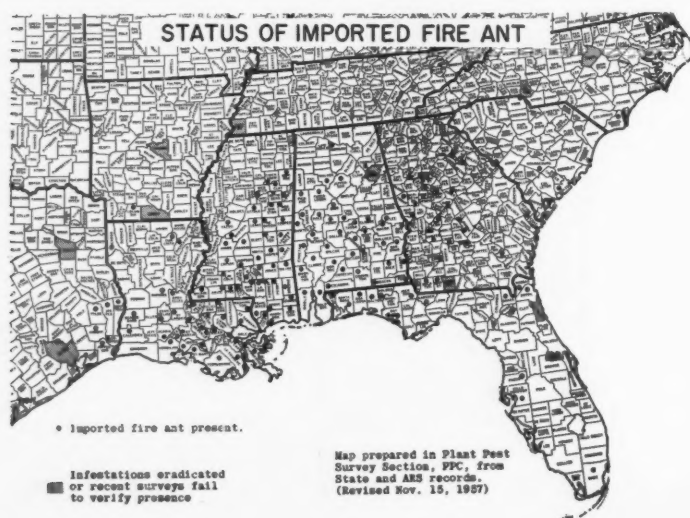
The program was initiated during November with insecticide applications being made in Louisiana and Georgia. Work was to begin at an early date in Alabama.

A hearing was held at Memphis, Tenn., November 19, to consider a proposed Federal-domestic quarantine on account of the imported fire ant. Nearly 100 persons attended the hearing, including Federal and state regulatory authorities; representatives of canning companies, nursery and transplant associations, forest industries; and other interested individuals.

The quarantine would be limited to the states known to be infested. Before it becomes effective the evidence presented at the hearing must be reviewed and the decision of quarantine determined. If it is decided to quarantine, the notice of quarantine will be published in the Federal register.

BOLL WEEVIL HIBERNATION COUNTS HIGH IN MISS.

The first report on the fall survey, to determine the number of cotton boll weevils entering hibernation, was received from Missis-



issippi. An early killing frost on October 25 and 26 made possible the samples early in November. Each sample consisted of two square yards of surface woods trash and was taken from 7 or 8 locations in each county. A total of 360 samples were collected from four areas in the State. Each area was comprised of four counties. Live weevils were found hibernating at the following ratio per acre: Lower delta 5243; central delta 6269; north delta 11,264, and the hill section 4087. The average number of live weevils per acre for the State was 6716 compared with 2091 in 1956 and 5054 in 1955. The range in numbers per location was from zero to 85,498.

OTHER INSECT HIGHLIGHTS

The Mediterranean fruit fly eradication program in Florida continues very encouraging. The only fruit flies captured since September were four on November 6 in Manatee county and two on November 26 on Sneads Island

of the same county. Evidently the source of infestation exists in wild guava in the Manatee river area. The initial spraying of the area in the vicinity of the November 6 find had been completed by the last of November and was initiated in the area of the November 26 find immediately. In Hillsborough county bait spraying has been completed and the area was released from quarantine November 5. This leaves Manatee county the only area in Florida under quarantine for the Mediterranean fruit fly. An aggregate of more than 6,747,000 acres had been treated by November 30, 1957, under the Federal-state cooperative program to eradicate the pest.

The spotted alfalfa aphid was reported in late October from Ohio for the first time. Light populations were recorded in Hamilton and Brown counties with the easternmost record being near Higginsport. All infestations were from areas close to the Ohio River.

In the treatment-detection Mex-

ican fruit fly program of southern California and Baja California and Sonora, Mexico trapping results continue to be negative. No Mexican fruit flies have been taken since July in southern California and none in Baja California, Mexico since August. ▲

GRASSHOPPERS POST THREAT

Federal-State surveys made during the past few months show that grasshoppers were found on 18,700,000 acres of rangeland in 16 states. The survey indicates that some 6 million acres in the Texas Panhandle should be watched closely next spring. Also, Montana has about 5 million acres in the same condition, California more than 3 million, and eastern Colorado about 1½ million. Smaller potential trouble spots were found in adjoining areas of Washington, Oregon, Idaho, and in Wyoming, Utah, Nevada, New Mexico, Nebraska, and South Dakota.

Production — September, 1957

Compiled from Government Sources

Chemical	Unit	September		August
		1957	1956	1957
Ammonia, synth. (anhydrous).....	s. tons	290,624	257,014	294,507
Ammonia byproduct liquor (NH ₃ content).....	s. tons	1,339	1,448	1,385
Ammonium nitrate, fert. grade (100% NH ₄ NO ₃).....	s. tons	186,244	138,086	190,413
Ammonium sulfate				
synthetic (technical).....	s. tons	83,541	93,462	84,575
by-product (incl. amm. thiocyanate).....	s. tons	1,339	1,448	1,385
BHC (Hexachlorocyclohexane).....	pounds	—	6,164,005	—
Gamma content.....	pounds	—	1,040,016	—
Calcium arsenate (commercial).....	s. tons	—	1	313
Copper sulfate (gross).....	s. tons	5,828	4,792	6,972
DDT.....	pounds	—	11,911,632	—
2,4-D Acid.....	pounds	—	2,317,615	—
esters and salts.....	pounds	—	1,609,714	—
esters and salts (acid equiv.).....	pounds	—	1,141,828	—
Lead Arsenate (acid and basic).....	s. tons	1	1	1
Phosphoric acid (50% H ₃ PO ₄).....	s. tons	371,984	289,747	353,015
Sulfur, native (Frasch).....	l. tons	—	—	—
Recovered ²	l. tons	—	—	—
Sulfuric acid, gross (100% H ₂ SO ₄).....	s. tons	1,347,705	1,322,684	*1,304,437
Superphosphate (100% APA).....	s. tons	188,128	171,604	*170,834
Normal and enriched (100% APA).....	s. tons	99,628	97,628	*92,054
Concentrated (100% APA).....	s. tons	69,456	57,170	63,787
Other phos. fertilizers (incl. wet-base goods).....	s. tons	19,044	15,650	*14,993
2,4,5-T Acid.....	pounds	—	67,434,480	—
Urea.....	pounds	—	1	—

*Revised. **Partly estimated. ¹Withheld to avoid disclosing figures for individual establishments. ²Recovered sulfur of a purity of 97 per cent or greater. ³Excludes enriched superphosphate, quantities of which if added to normal superphosphate fertilizers would account for less than 2 per cent of the total. ⁴Excludes wet-base goods, quantities of which if added to other phosphatic fertilizers would account for less than 4 per cent of the total for items except stocks. Stocks of wet-base goods would account for less than 5 per cent.

CHEMICALS

NO RELATIONSHIP BETWEEN PHOS. WATER SOLUBILITY AND OAT YIELD

Recent fertilizer investigations at the Kansas agricultural experiment station have shown no definite relationship between the degree of water solubility of phosphorous in the fertilizers, and the yield of oats produced.

Floyd Smith, soils professor at the college, reported on a trial at the Ashland agronomy farm where application of a fertilizer in which only about a fourth of the phosphorus was water soluble, produced a greater increase in yield than one in which three-fourths of the phosphorus was water soluble.

SOILS EXPERT CITIES VALUE OF PASTURE FERTILIZATION

Prof. C. J. Chapman, University of Wisconsin soils expert, reporting on a controlled demonstration conducted near Mauston, Wis., stated that "Our experiment shows that a farmer who properly fertilizes and irrigates his pasture can regain not only his original investment in the fertilizer and equipment, but more than an equal amount in extra profit."

The demonstration, an attempt to improve the quality of the state's pasture land, was conducted in cooperation with the Juneau County Agricultural Extension Service, the University of Wisconsin Department of Soils,

and the Olin Mathieson Chemical Corp., which furnished the fertilizers and irrigation equipment.

Figures cited by Professor Chapman show that the net value of milk from a fertilized and irrigated piece of pasture was \$878.89, compared with \$482.26 from a comparable section which was unfertilized and unirrigated.

NEW SYSTEMIC CONTROLS GRUBS AND SCREWORMS

Owen H. Graham, USDA entomologist, stated that a new systemic insecticide under development has been found highly effective in combatting grub infestations in cattle and as a deterrent to screwworm attacks in sheep and cattle.

Speaking at the fifth annual meeting of the Entomological Society of America held last month in Memphis, Tenn., he cited a series of experiments using the new commercial compound, Bayer 21/199. These tests showed that cattle grubs, the larvae of heel flies, failed to appear in the backs of cattle sprayed with the compound.

The spray treatments appeared more effective than oral administration. Dr. Graham emphasized that spray treatments with a systemic would be a highly practical method of grub control if applied at the proper time of year and in such a manner as to insure adequate skin absorption of the insecticide.

Tests also indicated that Bayer 21/199 sprayed on sheep destroyed screwworms in wounds, and in

addition provided protection against screwworm attack for 2 to 3 weeks.

DOWPON REGISTERED FOR FRUIT TREES, ASPARAGUS

Dow Chemical Co. has announced that the use of Dowpon for controlling grass around apple and pear trees and in asparagus beds has been registered with the federal regulatory agencies.

Registration of the practices followed three years of cooperative experiment station and Dow research.

NEW FUMIGANT DISCUSSED

Robert E. McKenzie, of Union Carbide Chemical Co.'s Crag Agricultural Chemicals Dept., delivered a paper on the company's Mylone fumigant at the Sixth Annual Oregon Weed Conference, Corvallis, Ore.

McKenzie said that the chemical has given consistently good performance and stressed its safety and ease of application.

Formulated as a white powder, the product is applied dry in a fertilizer three weeks before planting. After treatment, the material is irrigated into the soil surface. It is used to control weed seeds, soil diseases, insects, and nematodes in plant and propagating beds.

Currently, Mylone is being used commercially on ornamental and tobacco seed beds. Experimental applications continue in vegetable, forest-tree seed beds and on turf.

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FERTILIZER MATERIALS MARKET

New York

December 20, 1957

Sulfate of Ammonia. With continued exports to the Far East and a lower steel rate of production, demand and supply seemed to be more in balance than at any time in recent months and with the expected rise in Spring demand for top dressing, etc., producers were in a stronger position marketwise.

Ammonium Nitrate. With higher prices scheduled to go into effect on January 1, a better movement was noted for this material as buyers took advantage of present prices.

Urea. Less demand was noted from industrial users but fertilizer buyers were expected to increase their use with the approach of the Spring season.

Nitrogenous Tankage. While some producers still claim to be sold out for the balance of 1957, other material seems to be available for prompt shipment at prices ranging from \$3 to \$4 per unit of ammonia (\$3.64 to \$4.16 per unit N) with a fair demand noted.

Castor Pomace. Some slight weakening in the price structure of this material was recently noted and sales were made on the basis of \$42.50 per ton, f.o.b. production points. It is said a considerable quantity of imported castor pomace recently arrived at Southern ports with the result that domestic producers were forced to lower their prices.

Organics. Trading was mixed in organic fertilizer materials with buyers showing hesitation in taking on commitments. Blood sold at \$5.25 per unit of ammonia (\$6.38 per unit N) f.o.b. Eastern shipping points and tankage sold at \$4.75 per unit of ammonia (\$5.77 per

unit N). Soybean meal was still on the easy side with last sales at \$42.50 per ton, f.o.b. Decatur, Ill., in bulk for prompt shipment and \$1 per ton higher for later shipments. Cottonseed meal advanced about \$2 per ton to \$56 per ton in bags, f.o.b. Memphis, Tenn., because of the short cotton crop this year. Linseed meal was slightly higher in price as colder weather brought an increased demand from the feed trade.

Fish Meal. The activity was on the slow side in fish meal as buyers were slow to take on additional quantities. Last sales of 60 per cent menhaden fish meal were made at \$126 to \$128 per ton, f.o.b. fish factories. It was reported that the foreign market was weak with low priced offers failing to attract attention in this market.

Superphosphate. Producers were holding their prices for this material because of constantly increased costs of production. Movement was said to be fairly good in some directions as most fertilizer manufacturers are now operating at full capacity.

Potash. No changes were noted but demand was said to be only fair and with some sections reporting shipments behind last year. Foreign potash continues to arrive at various Atlantic ports as charter rates for freight ease up.

Philadelphia

December 20, 1957

The materials market continues rather listless although the situation is helped somewhat by rather fair export demand and some decline in production. Some price advances will be effective January 1, 1958.

Sulfate of Ammonia. Market is seasonally quiet with only slight domestic buying interest. Export movement and reduced production tend to relieve inventories. Coke-oven is quoted at \$32 per ton.

Ammonium Nitrate. Situation is reported stronger due to use in markets other than fertilizer and also by the better sulfate of ammonia position. The price is scheduled to go to \$72 per ton January 1, 1958.

Nitrate of Soda. This continues same as for several months past, with domestic listed at \$45.25 per ton in bulk and \$48.75 bagged. The Chilean is priced at \$46.25 in bulk and \$49.75 per ton bagged. There is ample material to meet the demand.

Urea. This is quoted at \$110 per ton for the agricultural grade—45 per cent nitrogen.

Blood, Tankage, Bone. These articles are moving slowly and in small lots. Supplies are abundant and blood is listed at \$5 per unit ammonia (\$6.08 per unit N) New York area and \$5.75 (\$6.38 per unit N) per unit Chicago area. Tankage is \$4.75 (\$5.77 per unit N) New York area and \$5.50 (\$6.68 per unit N) Chicago. Bone meal is still quoted at \$62.50 per ton.

Castor Pomace. This is nominal at \$45.50 per ton.

Fish Scrap. The supply is plentiful with demand only fair. Scrap is quoted at \$122 to \$124 per ton, and menhaden meal \$126 to \$128.

Superphosphate. Demand is normally apathetic. While production is somewhat behind last year, the supply is sufficient. There is considerable export movement of triple grade—listed at 98 cents per unit APA per ton. Normal grade is quoted at 90 to 92 cents per unit APA per ton.

Potash. Conditions are said to have improved somewhat and movement is fairly good. Muriate is listed at 34½ to 37 cents per unit K₂O per ton.

FERTILIZER AND PLANT NUTRIENT CONSUMPTION

(Continued from page 42)

three per cent decrease in the South Atlantic region is the same as the percentage decrease in use of fertilizers in this region.

The total consumption of primary plant nutrients supplied by mixed fertilizers is estimated to have been 4,296,000 tons, comprising 841,000 tons of nitrogen, 1,772,000 tons of available P₂O₅, and 1,683,000 tons of K₂O. These quantities represent 44,000 tons (5.5 per cent) more nitrogen, 28,000 tons (1.7 per cent) more K₂O, and 13,000 tons (0.7 per cent) less available P₂O₅ than was used in 1955-56. Materials used for direct application supplied 1,284,000 tons of nitrogen, 471,000 tons of available P₂O₅, and 252,000 tons of K₂O, representing increases of 148,000 tons (13.0 per cent) for nitrogen, 9,000 tons (1.9 per cent) for available P₂O₅, and 32,000 tons (14.5 per cent) for K₂O as compared with 1955-56. The trend to mixed fertilizers having relatively

lower available P₂O₅ content has caused an annual decrease in the national consumption of available P₂O₅ since 1954-55 in spite of the increased use of higher analysis phosphate bearing materials.

The increase in tonnage of plant nutrients was highest in the West North Central and East North Central regions. Their combined tonnage showed an increase for nitrogen, 89,000 tons; available P₂O₅, 26,000 tons; and K₂O, 49,000 tons.

The national weighted average of the primary plant nutrients contained in mixed fertilizers as shown by this preliminary analysis in 1956-57 was for nitrogen, 5.77 per cent; for available P₂O₅, 12.16 per cent; for K₂O, 11.55 per cent; and for the total of these nutrients, 29.48 per cent. The corresponding values in the preceding year were 5.39, 12.08, 11.20, and 28.67 per cent. The proportionate increase was highest for nitrogen and lowest for P₂O₅. ▲

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FARM CHEMICALS

Buyers' Guide

Classified Index to Advertisers in 'Farm Chemicals'

ALDRIN

Ashcraft-Wilkinson Co., Atlanta, Ga.

AMMONIA—Anhydrous and Liquor

Allied Chemical & Dye Corp., Nitrogen Div., N.Y.C.
American Cyanamid Co., New York City
Ashcraft-Wilkinson Co., Atlanta, Ga.
Commercial Solvents Corporation, New York City
E. I. duPont de Nemours & Co., Wilmington, Del.
Escambia Chem. Corp., Pensacola, Fla.
Grand River Chem. Div., Deere & Co., Tulsa, Okla.
Mississippi River Chem. Co., St. Louis, Mo.
Phillips Chemical Co., Bartlesville, Okla.
Sinclair Chemicals, Chicago, Ill.
Sohio Chemical Co., Lima, O.
The Texas Co., New York City

AMMONIUM NITRATE

American Cyanamid Co., New York City
Ashcraft-Wilkinson Co., Atlanta, Ga.
Commercial Solvents Corporation, New York City
Escambia Chem. Corp., Pensacola, Fla.
Monsanto Chem. Co., St. Louis, Mo.
Mississippi River Chem. Co., St. Louis, Mo.
Phillips Chemical Co., Bartlesville, Okla.

AMMONIUM SULFATE

See Sulfate of Ammonia

BAGS—BURLAP

The Burlap Council, New York City
Chase Bag Co., Chicago, Ill.

BAGS—COTTON

Chase Bag Co., Chicago, Ill.

BAGS—Multiwall-Paper

Chase Bag Co., Chicago, Ill.
Hudson Pulp & Paper Corp., N.Y.C.
Kraft Bag Corporation, New York City
Union Bag—Camp Paper Corp., New York City

BAGS—Dealers and Brokers

Ashcraft-Wilkinson Co., Atlanta, Ga.

BAG PRINTING MACHINES

Schmutz Mfg., Louisville, Ky.

BAG CLOSING MACHINES

Dave Fischbein Co., Minneapolis, Minn.

BAG FILLING MACHINES

Chase Bag Co., Chicago, Ill.
E. D. Coddington Mfg. Co., Milwaukee, Wisc.
Kraft Bag Corporation, New York City
Stedman Foundry and Machine Co., Aurora, Ind.
Union Bag—Camp Paper Corp., New York City

BHC AND LINDANE

Ashcraft-Wilkinson Co., Atlanta, Ga.
Pennsylvania Salt Mfg. Co., of Wash., Tacoma, Wash.

BIN LEVEL CONTROLS

Blue Valley Equip. Mfg. & Eng. Co., Topeka, Kans.
Stephens-Adamson Mfg. Co., Aurora, Ill.

BIN DISCHARGERS

Stephens-Adamson Mfg. Co., Aurora, Ill.

BONE PRODUCTS

American Agricultural Chemical Co., N.Y.C.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Jackle, Frank R., New York City
Woodward & Dickerson, Inc., Philadelphia, Pa.

BORAX AND BORIC ACID

American Potash & Chemical Corp., Los Angeles, California
Woodward & Dickerson, Inc., Philadelphia, Pa.

BOX CAR LOADERS

Stephens-Adamson Mfg. Co., Aurora, Ill.

BROKERS

Ashcraft-Wilkinson Co., Atlanta, Ga.
Bradley & Baker, N.Y.C.
Jackle, Frank R., New York City
Keim, Samuel D., Philadelphia, Pa.
Woodward & Dickerson, Inc., Philadelphia, Pa.

BULK TRANSPORTS

Baughman Mfg. Co., Jerseyville, Ill.

CALCIUM ARSENATE

American Agricultural Chemical Co., N.Y.C.

CAR PULLERS

Stephens-Adamson Mfg. Co., Aurora, Ill.

CARS AND CART

Stedman Foundry and Machine Co., Aurora, Ind.

CASTOR POMACE

Ashcraft-Wilkinson Co., Atlanta, Ga.
H. J. Baker & Bro., N.Y.C.

CHEMISTS AND ASSAYERS

Shuey & Co., Inc., Savannah, Ga.

CHLOROBENZILATE

Geigy Agr. Chems. Div. Geigy Chem. Corp. N.Y.C.

CHLORDANE

Ashcraft-Wilkinson Co., Atlanta, Ga.
Velsicol Chemical Corp., Chicago, Ill.

CLAY

Ashcraft-Wilkinson Co., Atlanta, Ga.
Thomas Alabama Kaolin Co., Baltimore, Md.

CONDITIONERS

Ashcraft-Wilkinson Co., Atlanta, Ga.
H. J. Baker & Bro., New York City
Jackle, Frank R., New York City
Keim, Samuel D., Philadelphia, Pa.
National Lime & Stone Co., Finlay, Ohio
U. S. Graphite Co., Saginaw, Mich.

CONVEYORS

Baughman Mfg. Co., Jerseyville, Ill.
Blue Valley Equip. Mfg. & Eng. Co., Topeka, Kans.
Finco Inc., North Aurora, Ill.
Joy Mfg. Co., Pittsburgh, Pa.
Stedman Foundry and Machine Co., Aurora, Ind.
Stephens-Adamson Mfg. Co., Aurora, Ill.
Sturtevant Mill Co., Boston, Mass.

COPPER SULFATE

Tennessee Corp., Atlanta, Ga.

COTTONSEED PRODUCTS

Ashcraft-Wilkinson Co., Atlanta, Ga.
Bradley & Baker, N.Y.C.
Jackle, Frank R., New York City
Woodward & Dickerson, Inc., Philadelphia, Pa.

DDT

Ashcraft-Wilkinson Co., Atlanta, Ga.
Geigy Agr. Chems., Geigy Chem. Corp., N.Y.C.
Monsanto Chem. Co., St. Louis, Mo.

DIAZINON

Geigy Agr. Chems. Geigy Chem. Corp., N.Y.C.

DIELDRIN

Ashcraft-Wilkinson Co., Atlanta, Ga.

DILUENTS

Ashcraft-Wilkinson Co., Atlanta, Ga.

DRUMS—STEEL

Vulcan Containers, Inc., Bellwood, Ill.
Vulcan Steel Container Co., Birmingham, Ala.

DUST CONTROL

Johnson-March, Philadelphia, Pa.

ELEVATORS

Blue Valley Equip. Mfg. & Eng. Co., Topeka, Kans.
Link-Belt Co., Chicago, Ill.
Stedman Foundry and Machine Co., Aurora, Ind.
Stephens-Adamson Mfg. Co., Aurora, Ill.

EMULSIFIERS

Emulsol Chemical Corp., Chicago, Ill.

ENDRIN

Velsicol Chemical Corp., Chicago, Ill.

ENGINEERS—Chemical and Industrial

Blue Valley Equip. Mfg. & Eng. Co., Topeka, Kans.
Stedman Foundry and Machine Co., Aurora, Ind.
Sturtevant Mill Co., Boston, Mass.

FERTILIZER—Liquid

Clover Chemical Co., Pittsburgh, Pa.

FERTILIZER—MIXED

American Agricultural Chemical Co., N.Y.C.
Armour Fertilizer Works, Atlanta, Ga.
Davison Chemical Co., div. of W. R. Grace & Co., Baltimore, Md.
International Min. & Chem. Corp., Chicago, Ill.

FILLERS

Bradley & Baker, N.Y.C.

FISH SCRAP AND OIL

Ashcraft-Wilkinson Co., Atlanta, Ga.
Bradley & Baker, N.Y.C.
Jackle, Frank R., New York City
Woodward & Dickerson, Inc., Philadelphia, Pa.

FULLER'S EARTH

Ashcraft-Wilkinson Co., Atlanta, Ga.

FUNGICIDES

American Agricultural Chemical Co., N.Y.C.
Roberts Chemicals, Inc., Nitro, W. Va.
Tennessee Corp., Atlanta, a.

GIBBERELLIC ACID

Eli Lilly & Co., Indianapolis, Ind.
Merck & Co., Rahway, N.J.

HEPTACHLOR

Velsicol Chemical Corp., Chicago, Ill.

HERBICIDES

American Cyanamid Co., New York City
American Potash & Chemical Corp., Los Angeles, California
Monsanto Chem. Co., St. Louis, Mo.

HOPPERS & SPOUTS

Stedman Foundry and Machine Co., Aurora, Ind.
Sturtevant Mill Co., Boston, Mass.

IMPORTERS, EXPORTERS

Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Woodward & Dickerson, Inc., Philadelphia, Pa.

KAOLIN

Thomas Alabama Kaolin Co., Baltimore, Md.

INSECT REPELLENT

Glenn Chemical Co., Inc., Chicago, Ill.

INSECTICIDES

American Agricultural Chemical Co., N.Y.C.
American Cyanamid Co., New York City
American Potash & Chemical Corp., Los Angeles, California
Ashcraft-Wilkinson Co., Atlanta, Ga.
Geigy Agr. Chems., Div. Geigy Chem. Corp., N.Y.C.
Pennsylvania Salt Mfg. Co., of Wash., Tacoma, Wash.
Velsicol Chemical Corp., Chicago, Ill.

IRON CHELATES

Geigy Agr. Chems., Div. Geigy Chem. Corp., N.Y.C.
Tennessee Corp., Atlanta, Ga.

IRON SULFATE

Tennessee Corp., Atlanta, Ga.

LABORATORY SERVICES

Wisc. Alumni Research Foundation, Madison, Wisc.

LEAD ARSENATE

American Agricultural Chemical Co., N.Y.C.

LIMESTONE

American Agricultural Chemical Co., N.Y.C.
Ashcraft-Wilkinson Co., Atlanta, Ga.
National Lime & Stone Co., Finlay, Ohio

MACHINERY—Acid Making and Handling

Monarch Mfg. Works, Inc., Philadelphia, Pa.
Stedman Foundry and Machine Co., Aurora, Ind.
Sturtevant Mill Co., Boston, Mass.

MACHINERY—Acidulating

Stedman Foundry and Machine Co., Aurora, Ind.

MACHINERY—Grinding and Pulverizing

Blue Valley Equip. Mfg. & Eng. Co., Topeka, Kans.
Bradley Pulverizer Co., Allentown, Pa.
Grundler Crusher and Pulverizer Co., St. Louis, Mo.
Poulsen Co., Los Angeles, Calif.
Stedman Foundry and Machine Co., Aurora, Ind.
Sturtevant Mill Co., Boston, Mass.

Buyers' Guide

MACHINERY—Material Handling

Blue Valley Equip. Mfg. & Eng. Co., Topeka, Kans.
Clark Equip. Co., Construction Mach. Div., Benton Harbor, Mich.
Grundler Crusher and Pulverizer Co., St. Louis, Mo.
Hough, The Frank G. Co., Libertyville, Ill.
Joy Mfg. Co., Pittsburgh, Pa.
Poulsen Co., Los Angeles, Calif.
Stedman Foundry and Machine Co., Aurora, Ind.
Stephen-Adamson Mfg. Co., Aurora, Ill.
Sturtevant Mill Co., Boston, Mass.
Tractomotive Corp., Deerfield, Ill.

MACHINERY—Mixing and Blending

Blue Valley Equip. Mfg. & Eng. Co., Topeka, Kans.
Gruender Crusher and Pulverizer Co., St. Louis, Mo.
Poulsen Co., Los Angeles, Calif.
Stedman Foundry and Machine Co., Aurora, Ind.
Sturtevant Mill Co., Boston, Mass.

MACHINERY—Mixing, Screening and Bagging
Poulsen Co., Los Angeles, Calif.
Stedman Foundry and Machine Co., Aurora, Ind.
Sturtevant Mill Co., Boston, Mass.

MACHINERY—Power Transmission

Stedman Foundry and Machine Co., Aurora, Ind.

MACHINERY

Superphosphate Manufacturing

Stedman Foundry and Machine Co., Aurora, Ind.
Sturtevant Mill Co., Boston, Mass.

MALATHION

American Cyanamid Co., New York City

MANGANESE SULFATE

Tennessee Corp., Atlanta, Ga.

MANURE SALTS

Potash Co. of America, Washington, D. C.

METHOXYCHLOR

Geigy Agr. Chems., Div. Geigy Chem. Corp., N.Y.C.

MINOR ELEMENTS

Geigy Agr. Chems., Div. Geigy Chem. Corp., N.Y.C.
Tennessee Corporation, Atlanta, Ga.

MIXERS

Blue Valley Equip. Mfg. & Eng. Co., Topeka, Kans.
Rapid Machinery Co., Marion, Iowa
Stedman Foundry and Machine Co., Aurora, Ind.
Sturtevant Mill Co., Boston, Mass.

NITRATE OF SODA

Allied Chemical & Dye Corp., Nitrogen Div., N.Y.C.
American Agricultural Chemical Co., N.Y.C.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Bradley & Baker, N.Y.C.
International Min. & Chem. Corp., Chicago, Ill.
Woodward & Dickerson, Inc., Philadelphia, Pa.

NITROGEN SOLUTIONS

Allied Chemical & Dye Corp., Nitrogen Div., N.Y.C.
American Cyanamid Co., New York City
Ashcraft-Wilkinson Co., Atlanta, Ga.
Commercial Solvents Corporation, New York City
E. I. duPont de Nemours & Co., Wilmington, Del.
Eccambia Chem. Corp., Pensacola, Fla.
Mississippi River Chem. Co., St. Louis, Mo.
Phillips Chemical Co., Bartlesville, Okla.
Sinclair Chemicals, Chicago, Ill.
Sohio Chemical Co., Lima, O.
The Texas Co., New York City

NITROGEN MATERIALS—Organic

American Agricultural Chemical Co., N.Y.C.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Bradley & Baker, N.Y.C.
International Min. & Chem. Corp., Chicago, Ill.
Jackle, Frank R., New York City
Woodward & Dickerson, Inc., Philadelphia, Pa.

NOZZLES—Spray

Monarch Mfg. Works, Philadelphia, Pa.
Spraying Systems Co., Bellwood, Ill.

PAIS—STEEL

Vulcan Containers, Inc., Bellwood, Ill.
Vulcan Steel Container Co., Birmingham, Ala.

PARATHION

American Cyanamid Co., New York City
Ashcraft-Wilkinson Co., Atlanta, Ga.
Monsanto Chem. Co., St. Louis, Mo.

PHOSPHATE ROCK

American Agricultural Chemical Co., N.Y.C.
American Cyanamid Co., New York City
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Bradley & Baker, N.Y.C.
International Min. & Chem. Corp., Chicago, Ill.
Woodward & Dickerson, Inc., Philadelphia, Pa.

PHOSPHORIC ACID

American Agricultural Chemical Co., N.Y.C.
Allied Chemical & Dye Corp., General Chemical Div., N.Y.C.

PLANT CONSTRUCTION—Fertilizer and Acid

Blue Valley Equip. Mfg. & Eng. Co., Topeka, Kans.
Stedman Foundry and Machine Co., Aurora, Ind.
Sturtevant Mill Co., Boston, Mass.

POTASH—Muriate

American Potash & Chemical Corp., Los Angeles, California
Ashcraft-Wilkinson Co., (Duval Potash) Atlanta, Ga.
H. J. Baker & Bro., N.Y.C.
Bonnevill, Ltd., Salt Lake City, Utah
Bradley & Baker, N.Y.C.
Duval Sulphur & Potash Co., Houston, Tex.
International Min. & Chem. Corp., Chicago, Ill.
National Potash Co., N.Y.C.
Potash Co. of America, Washington, D.C.
Southwest Potash Corp., New York City
United States Potash Co., N.Y.C.

POTASH—Sulfate

American Potash & Chemical Corp., Los Angeles, California
International Min. & Chem. Corp., Chicago, Ill.
Potash Co. of America, Washington, D.C.

PRINTING PRESSES—Bag

Schmutz Mfg. Co., Louisville, Ky.

PYROPHYLLITE

Ashcraft-Wilkinson Co., Atlanta, Ga.

REPAIR PARTS AND CASTINGS

tedman Foundry and Machine Co., Aurora, Ind.

SCALES—Including Automatic Baggers

Exact Weight Scale Co., Columbus, O.
Stedman Foundry and Machine Co., Aurora, Ind.

SCREENS

Blue Valley Equip. Mfg. & Eng. Co., Topeka, Kans.
Finco Inc., North Aurora, Ill.
Ludlow-Saylor Wire Cloth Co., St. Louis, Mo.
Stedman Foundry and Machine Co., Aurora, Ind.
Sturtevant Mill Co., Boston, Mass.

SCRUBBERS

Johnson-March, Philadelphia, Pa.

SOLVENTS

Richfield Oil Corp., Los Angeles, Calif.

SHOVEL LOADERS

Clark Equip. Co., Benton Harbor, Mich.
Hough, The Frank G. Co., Libertyville, Ill.
Tractomotive Corp., Deerfield, Ill.

SLUDGE

H. J. Baker & Bro., New York City

SPRAYS

Monarch Mfg. Works, Inc., Philadelphia, Pa.
Spraying Systems Co., Bellwood, Ill.
Baughman Mfg. Co., Jerseyville, Ill.

SPREADERS, TRUCK

Baughman Manufacturing Co., Jerseyville, Ill.

STORAGE TANKS

Cole, R. D., Manufacturing Co., Newnan, Ga.

SULFATE OF AMMONIA

Allied Chemical & Dye Corp., Nitrogen Div., N.Y.C.
American Agricultural Chemical Co., N.Y.C.
American Cyanamid Co., New York City
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
H. J. Baker & Bro., N.Y.C.
Bradley & Baker, N.Y.C.
Jackle, Frank R., New York City
Phillips Chemical Co., Bartlesville, Okla.
Woodward & Dickerson, Inc., Philadelphia, Pa.

SULFATE OF POTASH—MAGNESIA

International Min. & Chem. Corp., Chicago, Ill.

SULFUR

Ashcraft-Wilkinson Co., Atlanta, Ga.
Texas Gulf Sulphur Co., New York City
Woodward & Dickerson, Inc., Philadelphia, Pa.

SULFUR—Dusting & Spraying

Ashcraft-Wilkinson Co., Atlanta, Ga.
U. S. Phosphoric Products Div., Tennessee Corp., Tampa, Fla.

SULFURIC ACID

Allied Chemical & Dye Corp., General Chemical Div., N.Y.C.

American Agricultural Chemical Co., N.Y.C.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Bradley & Baker, N.Y.C.
International Min. & Chem. Corp., Chicago, Ill.
U. S. Phosphoric Products Division, Tennessee Corp., Tampa, Fla.

SUPERPHOSPHATE

American Agricultural Chemical Co., N.Y.C.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
H. J. Baker & Bro., N.Y.C.
Bradley & Baker, N.Y.C.
Davison Chemical Co., div. of W. R. Grace & Co., Baltimore, Md.
International Min. & Chem. Corp., Chicago, Ill.
Jackle, Frank R., New York City
U. S. Phosphoric Products Division, Tennessee Corp., Tampa, Fla.
Woodward & Dickerson, Inc., Philadelphia, Pa.

SUPERPHOSPHATE—Concentrated

American Cyanamid Co., New York City
Armour Fertilizer Works, Atlanta, Ga.
H. J. Baker & Bro., N.Y.C.
Bradley & Baker, N.Y.C.
Davison Chemical Co., Div. of W. R. Grace & Co., Baltimore, Md.
International Min. & Chem. Corp., Chicago, Ill.
Phillips Chemical Co., Bartlesville, Okla.
U. S. Phosphoric Products Division, Tennessee Corp., Tampa, Fla.
Woodward & Dickerson, Inc., Philadelphia, Pa.

TALC

Ashcraft-Wilkinson Co., Atlanta, Ga.

TANKAGE

American Agricultural Chemical Co., N.Y.C.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
H. J. Baker & Bro., N.Y.C.
Bradley & Baker, N.Y.C.
International Min. & Chem. Corp., Chicago, Ill.
Jackle, Frank R., New York City
Woodward & Dickerson, Inc., Philadelphia, Pa.

TANKS—NH3 and Liquid N

Cole, R. D., Manufacturing Co., Newnan, Ga.

TOXAPHENE

Ashcraft-Wilkinson Co., Atlanta, Ga.

TRUCKS—SPREADER

Baughman Mfg. Co., Jerseyville, Ill.

UREA & UREA PRODUCTS

Allied Chemical & Dye Corp., Nitrogen Div., N.Y.C.
H. J. Baker & Bro., N.Y.C.
Bradley & Baker, N.Y.C.
E. I. duPont de Nemours & Co., Wilmington, Del.
Grand River Chem. Div., Deere & Co., Tulsa, Okla.
Sohio Chemical Co., Lima, O.

UREA-FORM

E. I. duPont de Nemours & Co., Wilmington, Del.
Nitro-Form Agricultural Chemicals, Woonsocket, R. I.

VALVES

Monarch Mfg. Works, Inc., Philadelphia, Pa.

ZINC SULFATE

Tennessee Corp., Atlanta, Ga.

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Midwestern Sales Office . . . First National Bank Bldg., Peoria, Ill.

Southern Sales Office . . . Candler Building, Atlanta, Ga.

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DOMESTIC

MATERIALS

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Miss.
us, Ohio